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The Battle of the German National Redoubt

— *Planning Phase*

Brigadier General Reuben E. Jenkins, *United States Army*

ALTHOUGH the Redoubt was not to be the last seat of the Nazi government, the possibility remained that it would still be the scene of a desperate stand by the fanatical elements of the armies south of the dividing line, together with those which might retreat northward out of Italy. These armies, totaling about 100 nominal divisions, included the bulk of the remaining German armored and SS formations, and up to thirty panzer divisions might conceivably be concentrated behind the mountain barriers. In addition, most of the surviving German jet fighter plane strength was located in the south. The conquest of the Redoubt area thus remained as an important objective of the Allies, despite the collapse of the rest of Germany. "Report by The Supreme Commander to The Combined Chiefs of Staff on the Operations in Europe."—THE EDITOR.

The National Redoubt

Allied ideas concerning the German "National Redoubt" did not begin to crystalize until February/March 1945. However, the possibility of the final battles of World War II being fought in such a heavily fortified area was being discussed by campaign planners in North Africa and London as early as the fall and winter of 1943. At that time bits of information, when pieced together, indicated that, if an Allied offensive on the continent defeated German arms, "National Socialism will withdraw its remaining forces to 'The Redoubt' for a final, historic, 'last man' stand, leaving German civilians (especially a Hitler Youth Organization, later known as the Werewolves) and small flying columns of the Wehrmacht hidden in inaccessible regions to spread terror in the extended Allied lines of communication." Elite German forces, composed largely of SS and mountain troops, would defend impenetrable positions organized in great depth, while guerrilla organizations, led by fanatical youths especially trained, would operate against the Allied rear. These latter activities would be of such magnitude as to require a major division of Allied combat troops to protect rear areas. Thus, after a year or two of expensive campaigning which failed to produce an "unconditional surrender," the Allies would exhaust themselves and offer the National Socialists a negotiated peace. Such was the pattern of the German dream in late 1943 and through 1944.

The project consisted of a "Redoubt Center" lying generally East-West through the Tyrol-Bavarian, Austrian and Italian Alps (see Map 1), and many strong covering positions in depth, on formidable terrain lying to the east, north and northwest, including central Germany and Czechoslovakia. The terrain of the "Redoubt Center" was the most compact, mountainous, inaccessible area available. Its extreme relief (to 12,000 feet), narrow, abrupt valleys and winding roads made it admirable for a determined defense by minimum forces well supplied and armed with modern mountain equipment. The deep network of covering positions was especially strong and, if well organized, could be held for a considerable time by limited

forces properly equipped and supplied.

The *final* covering position extended generally along the line indicated on Map 1. From Vienna south and west, the natural strength of this line is reinforced by the increasing defensive strength of the terrain lying between it and the Redoubt Center. From Vienna north and west, however, its defensive value depends wholly upon its natural strength and the communications system of the Bavarian plain, which facilitates rapid movement of large reserves. The potential strength of the east and north fronts of the line is seriously depreciated by their distance from the Redoubt Center, by the Danube which runs *in the rear* of the positions throughout the perimeter, and by the good avenues for penetration at Vienna, at Bayreuth, near Nurnberg, and north of Ulm. Although the Bavarian communications system affords great flexibility to the defense, once a break has been effected in the final covering positions, it affords an attacker great opportunities for rapid exploitation. It assists a penetrating force to cut off and destroy formations defending other sections of the line before they can be withdrawn across the Danube and to the Redoubt Center, especially if the line is penetrated anywhere between Nurnberg and Ulm, thus gaining control of the autobahn network to the south-southeast.

Planning the Campaign

Detailed planning designed to forestall a German effort to reach the Bavarian plain with strong forces from the north was initiated in October 1944 by Headquarters, Sixth Army Group (General Jacob L. Devers), the Seventh United States (Lieutenant General A. M. Patch) and First French (General de Lattre de Tassigny) Armies on the southern flank of the Allies. The objective selected to achieve the purpose was the triangle: Munich—Regensburg—Ulm, which contains the key to the rail and highway network leading to Austria from the north. Two broad plans of maneuver, or routes of approach, were considered: first, a drive from the right, due east, with the First French Army strongly reinforced, assisted by the Seventh Army right; and second, a drive on the left by a strongly reinforced Seventh Army assisted by the French left.

The first plan involved a crossing of the Rhine, a breach of the Black Forest and Schwabische Alp, and a crossing of the Danube before debouchement upon the Bavarian plain. This, indeed, would be a difficult operation and would require that the French be heavily reinforced. However, less strength would be required than for an effort on the left. The moving flank, in this plan, would be protected by the Swiss border. The serious problem in a main effort on the right would be one of logistical support, due to the scarcity of roads through the Black Forest and Schwabische Alp.

The second plan involved a crossing of the Rhine, a breach of the Schwabische—Frankische Alps and a crossing of the Danube. Although an effort on the left would miss the Black Forest, it would soon encounter terrain east of the Rhine almost as difficult, but with a marvelous communications network. In this plan, the moving flank would be exposed to the north unless the operation was launched in conjunction with an advance by Third Army. An exposed flank would require strength for the Seventh Army which was beyond SHAEF's ability to produce. If a situation were presented which permitted the Third and Seventh Armies to cross the Rhine together and drive as far east as Wurzburg, the task of overrunning the Bavarian plain could be accomplished by Sixth Army Group with considerably fewer divisions.

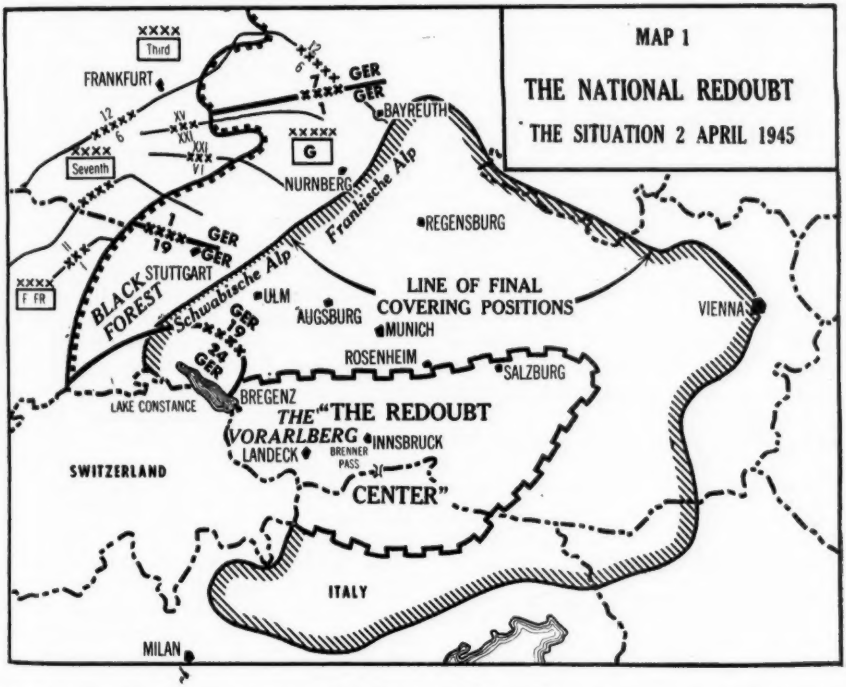
Security of the moving flank, hostile dispositions, and distance to the objective

favored the direct route through the Black Forest; but the "Colmar Pocket" and available divisions settled the question until the early spring of 1945. Furthermore, SHAEF's plans called for a closing to the Rhine throughout its length before any major offensive east of the Rhine.

In planning for a possible ultimate withdrawal from north Germany to the Redoubt area, the Germans apparently failed to take into account the disasters which might befall them prior to a decision to implement the plan. For example, the disaster of the "Bulge" was quickly followed by the disaster visited upon the Nineteenth German Army in the "Colmar Pocket," by the disaster visited upon the First and Seventh German Armies in the Saar Basin, and by the plunge east by the First United States Army from the Remagen bridgehead to join the dash of the Third and Seventh which crossed near Worms. Furthermore, the Ninth United States Army drive around the Ruhr and the First United States Army drive were soon to join, sealing up more than 300,000 Germans in the "Ruhr Pocket."

Despite events up to and including 1 April 1945, and the now very obvious early collapse of resistance in North Germany, the possibility of the establishment of a sizeable, formidable force in the Redoubt area could not be discounted. Strong, well equipped armies were still in Italy, the Balkans and Czechoslovakia, with the Sixth Panzer Army confronting the Russians in the Vienna area.

Also the Nineteenth, First, and Seventh



German Armies were being rapidly revitalized after the disasters of the "Colmar Pocket" and the Saar. The First and Nineteenth now boasted some twenty divisions and three brigades on the front of Sixth Army Group, with only nine of the divisions in the front line delaying the steady advance of the Seventh United States Army and five divisions in line opposing the First French Army, which had crossed the Rhine with its left. Six divisions were in reserve, refitting. Furthermore, some alarming bits of information had been gathered recently by Allied intelligence agencies, supporting strongly a theory that a National Redoubt actually existed, and that the Germans would defend it in their "last man stand." For example, significant items with substance as follows, were received from sources considered reliable: *a.* Himmler ordered that provisions be stored in the Vorarlberg area for 100,000 men in February. *b.* 1,800 signal corps men trained in mountain warfare have recently arrived in the Vorarlberg area. *c.* Concrete pillboxes, tank traps and other permanent defense works are being constructed in Bregenz area. *d.* A German officer in Italy stated that his troops will withdraw and become part of the Army Group being formed in Austria to defend the Redoubt. *e.* The Nazis will defend "The Redoubt Center" with eighty crack units of about 4,000 combat effectives each, with Hitler and Himmler in command.

The nature and extravagance of the stories gleaned mostly from German prisoners and German civilians indicated that they were "planted" upon the German soldier and civilian to bolster fading morale as well as for Allied consumption. Many of them were so fantastic that two schools of thought developed quickly among Allied intelligence officers. One school clung to the theory that a National Redoubt and a completed Redoubt Center existed, and that the Germans had definite plans for, and the capability of carrying out a long campaign to defend them. The other school advanced the theory that up to now such a plan existed only in the *imagination* of those below the German high command; that even at that level nothing more than generalized discussion had been accomplished until recently, and that certainly no detailed, coordinated organization of the Redoubt Center had been undertaken prior to February 1945.

By 1 April, the Nazi Armies in the west had been permanently defeated. If the large *hand picked army* was to arrive in the Redoubt Center ahead of the Allies, the SS, mountain and other elite formations should already be moving south from the center and northern portions of the western front. No such movement was in evidence. These formations remained in the German front lines. Operations planners proposed, however, that even if no plan for a Redoubt Center existed, the very nature of the combined Allied and Russian maneuver would squeeze the Germans in Italy, the Balkans, Austria, Czechoslovakia and southern Germany into the Redoubt Center unless operational plans were designed to get Allied columns to the passes into the Alps ahead of the Germans. If only a comparatively few of these Germans reached the Redoubt Center, and the Redoubt Center contained only a small fraction of the reported supplies, the Allies would be faced with an arduous and costly campaign in the Alps. One look at the situation map was sufficient to convince the most skeptical.

Allied plans in Italy contemplated multiple breakthroughs on scales sufficient to exploit at least as far north as the Alps and destroy the German Armies in Italy before they could withdraw to the Redoubt Center. Russian plans in the Vienna area were unknown. Operational plans on the western front for early April called for a twin drive by the right of Twelfth Army

Group to Leipzig and by the left of the Sixth Army Group as far east as the Bayreuth area to seal off central and north Germany. Thereafter operations would be opened to settle the Redoubt issue.

In view of the present condition of the Nineteenth, First and Seventh German Armies it was thought feasible to destroy them before they could reach the Redoubt Center. The greatest threat to a successful sealing of the Redoubt Center appeared to be posed by the strong mobile reserves of the German Army in Czechoslovakia. Accordingly, on 2 April, SHAEF directed the Sixth Army Group to "be prepared to launch a thrust on the axis: Nurnberg —Regensburg—Linz, to prevent consolidation of German resistance in the south" as its next phase following the conclusion of current operations. A main effort on this axis should cut off reinforcements for the Redoubt Center from the east with greater speed than would a drive from the present right or center of the Army Group.

Speed was now of the essence. SHAEF wanted to turn its attention to the south as quickly as possible. The Sixth Army Group felt it could open the next phase by 6/8 April. However, the situation in the Ruhr called for a "tight line." Every available division and supporting unit was needed by Twelfth Army Group to settle that issue. Meanwhile, other parts of the front must play it safe, even though what appeared to be marvelous opportunities were presented in the south. The soundness of SHAEF's decision in the matter is attested to by the fact that early estimates stated that there were 125,000 to 150,000 Germans in the "Ruhr Pocket," but when the battle ended after bitter fighting the total exceeded 300,000 by actual count. This was certainly much too large a force simply to isolate in the rear and undertake another major offensive the early successful outcome of which was in doubt.

This period of comparative "sitting tight" during the reduction of the "Ruhr Pocket" gave the First and Nineteenth German Armies the breathing spell they so badly needed. They were being reinforced from the north and from the Twenty-Fourth German (Administrative) Army along the Swiss border. They had twenty combat divisions and three brigades, well equipped by 8 April, the remnants of three more divisions, and one new division completing its mobilization. Two brigades and sixteen full divisions were in the line. The remnants of two more were in line. The remainder were in reserve, refitting. In addition, the Seventh German Army now had six divisions confronting the left of the Seventh United States Army, and its remaining divisions confronting the Third United States Army. Every day's delay in opening a strong offensive into south Germany gave these armies precious time to be reinforced and to perfect plans for a strong stand on the final covering positions and subsequent withdrawal to the Redoubt Center.

By 8 April it was foreseen that, with the currently increasing strength of German Army Group G (First and Nineteenth Armies) the tentative mission assigned Sixth Army Group on 2 April might be beyond the capabilities of its two armies totaling only nineteen divisions. In view of the progressively increasing German strength on the southern front, the twenty-five divisions originally estimated as probably required rose to "perhaps thirty-five to thirty-seven." These additional divisions could only be provided after the Ruhr issue was settled, another week at least, perhaps two. Also, the length of the Sixth Army Group front made an additional Army headquarters highly desirable.

Strategy dictated that the Germans be persuaded to remain in the Black Forest and well to the north of the strong Schwabische-Frankische Alps positions until a death blow could be delivered against one

or both of the First and Nineteenth Armies. If they were driven back to these extremely strong positions prematurely, they would be able to offer coordinated battle on the strongest positions in all of south Germany. On the other hand, if they could be induced to hold generally on their present line, particularly their center and left, it might be possible to destroy one army and part of another with one powerful blow before they could reach the mountain ranges north of the Danube. Hence, strong offensive action by the First French Army was now limited to attacks in the Rhine Plain west of the Black Forest, while decisive offensive action by Seventh United States Army was limited to that necessary to close on the Bayreuth area with its left corps. The German pursued his usual policy of flatly refusing to give up ground unless forced to do so, regardless of the now very obvious reasons for voluntarily seeking a better position for defensive battle farther to the rear. This characteristic had been a costly one for the Germans. Sixth Army Group now planned to capitalize upon this habit to an extent far exceeding other occasions.

The Nineteenth German Army was promptly earmarked for destruction west and north of the Schwabische Alp. Despite the growing strength of the German First and Nineteenth Armies, their dispositions had been looked upon with greater favor every day from 27 March. They began to offer opportunities an opposing field commander seldom sees. The possibility of such a situation developing had been foreseen by the Sixth Army Group during the battle of the Saar, and broad plans had been prepared for it. These plans envisaged a heavy drive initially by at least a corps from the right of Seventh Army, launched from East of Stuttgart, between the Black Forest and the Schwabische Alp, exploiting to the Swiss border to destroy the Germans caught in the Black Forest-Stuttgart area and bring the remainder of the First French Army rapidly east of the Rhine. A strong offensive would immediately follow to the east with the First French Army and the right of Seventh Army.

The plan called for the right corps of Seventh Army to be strong in armor and mobility (preferably two armored and three infantry divisions one of which was to be fully motorized). It also provided for a divisional airborne assault to be launched at the proper time to seize the key points in the communications network near the junction of the Black Forest and the Schwabische Alp, seize some special targets whose destruction SHAEF wanted to prevent, and hold or exploit from there pending the arrival of spearheads of the main attack corps. The left and center of Seventh Army were to maintain pressure initially and conform to the right of Twelfth Army Group. The French were to maintain pressure *east* of the Black Forest initially, and open a determined offensive *west* of the Forest to clear the Rhine plain. At the proper time, the French were to open a strong offensive *east* of the Forest, due south; in conjunction with the main attack corps to isolate and capture Stuttgart and destroy the Germans in the Black Forest; and thereafter be prepared to exploit to the east in a new zone of action.

This plan had been tentatively approved by SHAEF. The Thirteenth Airborne Division was designated for the airborne role. As the situation favoring the plan began to develop, detailed planning for its implementation was rushed to completion by both armies, the airborne division, and the Air Forces.

On 8 April SHAEF advised Sixth Army Group informally that the plan would undoubtedly be put into effect, though the date could not yet be predicted because of the Ruhr battle. The additional troops required could come only from that area.

The

Chaplain's Worth

to his Commander

Chaplain (Major General) Luther D. Miller
Chief of Chaplains

Introduction

RELIGIOUS life within the Army is a command responsibility. Can this responsibility be met by the commander through the chaplain? The question posed is a logical one. It is accepted by most military philosophers that the successful military system is the leader system in uniform. If this is true, then the commander who shows leadership in developing the spiritual life of his command has mobilized one of the most powerful agencies rested in his hand. AR 60-5 recognizes this fact and states specifically that nothing contained in army regulations concerning chaplains will be construed as relieving commanders of their responsibility for the efficiency of the religious program and of the chaplains under their command. Commanders are required to give the religious services to their command due share of their attention in order to insure their effectiveness. This subject is approached with a full appreciation of that fact, with all of its implications, that the responsibility for the religious life of the military establishment rests in the hands of a layman who is advised and assisted by the chaplain. The Corps of Chaplains does not desire to change the seat of responsibility. We do not wish in any way to confuse the issue, but we do hope to place the responsibility in its proper sphere.

The use made of the chaplain by the commander, even the very usefulness of the chaplain in the military situation, has been argued pro and con for as long as chaplains have served with military forces. This is not an attempt on the part of the Corps of Chaplains to recapitulate these arguments but to present first, the contribution of religion to the military establishment; second, the Corps of Chaplains as it now functions in the military community; third, the fact that the military forces ultimately give an accounting concerning their religious responsibility.

The Contribution of Religion to the Military Establishment

Centuries of experience show the necessity for the deliberate and systematic cultivation of spiritual forces and moral character in the military situation. Not only the spiritual forces and moral character have the same value to the individual in military as in civil life, but they are necessary if cordial relations between the civil and the military communities are to be maintained. Much of the telling reaction against the military forces in general, and universal military training in particular, is engendered by the church bodies and educational institutions of America. The basis of this seeming hostility can be traced to a feeling on the part of the civil community that the military community lacks a genuine interest in the religious life and moral character of the youth of America whom they are receiving for training and for defending the state.

Equally important are the spiritual con-

tributions of religion to military efficiency. Within the era of recorded history, the self-discipline and moral character of any social group have always been in proportion to their adherence to established religious practices. It is interesting to note that with the decline of religious practice among nations, cultures, or social groups, there comes a relative decline in law and order and a degeneration of the legal process. Similarly, a rise in one is accompanied by a rise in the other. In whatever measure man is taught to shun and hate evil, so in proportion he can be taught to hate the observable by-products of evil in the world. The man of disciplined character and conscious rectitude, associated with comrades and led by officers who command his respect, can be trusted to endure privation and perform his duties in camp or on the battlefield. He is possessed with the will to do. Native bravery and thorough training alone cannot produce the best type of soldier. In addition he must possess this personal spiritual sense of obligation in all of his relationships.

The Chaplain's Function

The chaplain enters the military picture as a staff officer, a professionally trained religious adviser, a technician in the field of religion and religious techniques and their use, a director of personal and group devotional expression which throughout the history of religion has been the religious technique that has produced individual action and leadership in times of crisis. He is professionally equipped to advise and assist the commander in his responsibility for religious life in the military establishment. He is the official representative of the church within the army organization.

As a staff officer, he is adviser to the commander in matters concerning the religious life, morals, morale, and related matters affecting military personnel of the command. By his careful staff representation of chaplains' affairs and the policies of the Chief of Chaplains, his most pronounced contribution is made. Through staff coordination and recommendation, he effects the establishment of local policy which will further guarantee to chaplains in the lower echelons equipment and material with which to work, and an adequate opportunity for their professional services. Though he is accepted as a staff officer, because of the cross or tablet he wears and his official designation as chaplain of the staff, the true strength of his staff contribution will be measured through his personal and professional solidarity.

His responsibilities, whether as an administrative or as a supervisory chaplain, to the chaplains assigned to units under the administrative or tactical control of the headquarters to which he is assigned are similar in every respect. If he is assigned to a headquarters which is the channel of the administration of personnel and equipment to lower or higher echelons, he is an administrative chaplain. If he is assigned to a purely tactical headquarters, he is a supervisory chaplain. Their responsibilities differ only as the missions of the headquarters to which they are assigned differ. In dealing with fellow chaplains of higher or lower echelons, the chaplain is firm, impartial, and considerate. To be a truly effective staff officer he must possess that high sense of spiritual dignity and humaneness which his position as chaplain denotes. Astuteness guides him in his choice of method to solve purely professional problems. Whenever possible such problems are handled and solved without resorting to command channels. Technical channels have solved many delicate professional problems that would have proved embarrassing to all concerned had they been submitted for a command decision.

Your attention is called to one fact concerning the responsibility of an administrative or supervisory chaplain in our

Army. He is charged with the responsibility of administering or supervising clergymen on a scale never attempted outside the military sphere. Certain church bodies on a basis of denominational or church unity have approached it through the Synod, Conference, Presbytery, Diocese, or office of the Bishop. Here in the Army one officer is set up to administer or supervise Protestant, Roman Catholic, and Jewish clergymen. This responsibility of supervision or administration is borne in a situation overlaid with all of the latent possibilities of social dislocations, national emergency, utter fatigue of nerve and body, and even death. The chaplain on your staff asks for no conformity from the chaplains of the three major faiths for whom he is responsible, but requires a spirit of cooperation among them which the military situation demands if the minimum religious needs of each unit are to be satisfied.

There has always been a greater need for religious ministrations in the Army than could be met by the physical and the legal ecclesiastical possibilities of individual chaplains assigned to military needs.

Since the responsibility for coordinating the religious work of assigned chaplains rests in the office of the administrative or supervisory chaplain, it is his responsibility to see that the unsatisfied needs for religious services within each unit are reduced to a minimum. The minimum of services provided for each unit should be Mass, Protestant worship, and Jewish service. This minimum, plus denominational services in many cases, can be achieved through the careful coordination of the services of assigned chaplains.

The two staff duties that are unique to the administrative chaplain, in addition to his supervisory duties, are those of the administration of personnel and equipment. The first duty, that of the administration of chaplain personnel assigned to units under the administrative control of the headquarters to which he is assigned, is of primary professional importance. The direct channel of administration of chaplain personnel is between the administrative chaplain and the G-1 or personnel officer of the headquarters. No one knows more thoroughly the strengths or weaknesses of chaplains than other chaplains. No duty accepted by any chaplain is more demanding of all his faculties than this one. Although the number of chaplains under his administration may be large, the capable administrative chaplain maintains current personnel information files concerning specific assignment requirements and the individual chaplain's capabilities. These files are maintained solely for purposes of effective and intelligent personnel placement recommendations. It is interesting to note that the type of information needed for these files can only be obtained through constant personal liaison with units, unit commanders, and chaplain personnel. The second of the unique duties of the administrative chaplain is that of officially representing the chaplains' needs for supplies and equipment. The ready availability of military supplies, authorized for the Corps of Chaplains, to chaplains of administered units will largely depend upon his careful pursuit of this staff duty through the G-4, quartermaster, and ordnance.

Because of the very nature of your chaplain's professional identity, his situation within the military, both physical and social, becomes one which is carefully scrutinized and appraised by all military personnel, enlisted and commissioned, and especially by his civilian and military fellow professionals. In the zone of the interior, in occupied foreign territories, in garrison, and in the field, the chaplain's office is visited constantly. The visitors are staff officers, fellow chaplains from lower echelons, enlisted men, local civil and church leaders, and just individuals seeking information, cooperation,

or assistance. Their common problems are religion, morals, and morale of both the military and local population.

The physical appointments and location of the chaplain's office and the type of individual these visitors meet in the person of the chaplain leave an indelible impression on their minds. This is especially true of the civilian in his reaction as to the relative position and importance of the religious program in the Armed Forces. The cooperation of the stable civil group with the Army will be measured in the same degree as religion, morals, and morale are deemed by them to be of importance to the Army. Though as a commander you may not personally be of positive religious persuasion, do not discount the force and power exerted by the church and its related organizations upon the civil population. The chaplain on your staff is the officer who knows and understands this group best. His liaison for you with them will prove of inestimable value.

There are two motives of chaplains as clergymen for becoming involved in matters of command responsibility, administrative and supervisory duties, professional skills, and coordination of religious ministrations. The first is a desire totally to integrate the chaplain and his work into the military situation. In doing this he knows that he becomes a useful, integral part of the whole military process. Failure to integrate means he is always carried as necessary impedimenta. The second motive—the desire to glorify Almighty God through a full and adequate representation of Him to the command—gives the power of penetration to the first.

These motives are not to be carried over or imparted to the military through brilliantly delivered, intellectually stimulating sermons, though good sermons are necessary. They will not be principally induced by our lovely chapels, though chapels are of great value to worship and we would be handicapped without them. These motives of the chaplain will be actuated largely through the unselfish giving of himself and his abilities to his mission. This giving on the part of the chaplain is in proportion to giving on the part of other officers. It is a unique type of giving, however, which makes a pronounced contribution to the completion of the development of the possibilities of the individual. The chaplain who is the recipient of the respect and admiration of officers and enlisted men, as well as civilians with whom he has professional associations, may be said to be the successful chaplain. The "hail-fellow-well-met" chaplain is the exception rather than the rule in the Corps. Indeed, the successful chaplain is, in time, the voice of admonition to the wayward, counselor to the spiritually and morally bewildered, the director of individual and group religious and devotional expression. The humaneness of the chaplain is not measured in terms of his own actions but is evaluated by his understanding and consideration of his fellows. The loyalty of the chaplain to the profession and to the command and its needs far outweighs his personal desire for consideration when successful religious ministration is the objective.

Much attention has been called to the heroic circumstances under which religious services were held by chaplains. Many allegations have been made concerning the religious zeal displayed in religious services under dangerous conditions. It must be remembered that these very situations are especially conducive to religious zeal and the practice of religion on the part of humanity. The efficacy of religion is not, however, to be discounted at these instances, for if one worshipper out of a group of ten, or one out of a thousand, is motivated to religious living through this expression, the religious effort is successful. In fairness, let us state that the carryover into religious living from crisis situations is not

astonishing in its magnitude. The results of this giving on the part of the chaplain have some bearing on military objectives taken, captured enemy personnel and equipment, destroyed enemy armies, air forces, and industrial areas, but it is measured in a different manner. It is measured in the sense of God's presence in the midst of our military life; a constant reinstilling by precept and example of the value of life and human personality in the heart of every soldier and officer; a realization that loyalty and service involve the very life, indeed the life's blood of men; a knowledge in our hours of anxiety and frustration that God has not yet written the whole story of life; a humble remembrance in our hours of victory that God gives us the power and the might to do these things.

Accountability for Religious Responsibility

It is a well established fact that a certain number of men will enter the Army and leave it and others will live their lives and die in the Army without religion's leaving a noticeable impression on their lives. This may be true, but we hold it to be our responsibility before God as chaplains to keep that number at a minimum. Little comfort or assurance can be taken by chaplains, commanders, or the military personnel in these last statements. The Corps of Chaplains can only counter that it still is our responsibility to keep the number unaffected by religion in the Army at the bare minimum by giving all an opportunity to receive religious ministration. These observations are not, however, an indictment of the military system of religious endeavor of the Corps of Chaplains. They are proof that the religious problems of the civilian church have only been transplanted into the military picture and manner and have been accentuated by the fact that we have a heavy concentration of the male population within every military establishment.

This normal, human, religious problem faced by commanders has been, and will be, handled well by the military by careful adherence to the system of religious endeavor here presented. Your chaplain has learned through personal experiences and by precept and example to adapt the techniques of the ministry to the military situation. The Corps of Chaplains has an experienced background of war and peace. Military clergymen in their role as administrative chaplains, supervisory chaplains, or chaplains of the line, from the Chief of Chaplains to the chaplains assigned to the disciplinary training barracks or the quartermaster service battalions, are your professionally trained advisers and assistants, technicians in the field of religious ministrations to military men and women. Their record speaks for itself.

I quote Major General Phillip Hayes, the Commanding General, Third Service Command, speaking to the Chaplains' Conference in 1944 in Baltimore, Maryland: "Again I say there is no individual who could be as helpful to his commanding officer as each and every one of you to your respective commanders. I ask you, then, to give all you have to them in every way because it is not easy in a large command to have a good command without your assistance."

Antiaircraft Artillery
in
Amphibious Operations

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WORLD War II has provided extensive tests of the effectiveness of existing War Department doctrine in the tactical employment of antiaircraft artillery units. The purpose of this article is to re-examine that doctrine as it pertains to amphibious operations.

Born as a purely defensive arm, the past war has proved antiaircraft artillery to be equally valuable as an offensive arm. In all operations, and particularly in amphibious operations, the antiaircraft problem requires the application of science, skill, technique and the employment of highly specialized and intricate equipment. The past war taught most ground commanders that this equipment was equally as effective in ground support missions as it was in its primary mission—antiaircraft defense. Likewise, the antiaircraft artillery commander learned that he should have a good concept of the capabilities and limitations of all the ground arms. The continuous application of sound tactics, the cooperation with air, ground, and service units, and the need for continuous operations, make this officer's job exacting and arduous.

FM 31-5 teaches that there are six general phases in the execution of an amphibious operation. These phases are: (1) planning, (2) concentration and specialized training, (3) embarkation, (4) voyages, (5) landing, (6) consolidation.

All of these six phases need and require antiaircraft protection. In many amphibious operations of the past war, the antiaircraft protection of some of the phases was completely overlooked, due at times to the haste of organizing and conducting the operations, but generally to the lack of understanding and comprehension of the antiaircraft artillery arm.

The senior antiaircraft officer assigned to any amphibious operation should be a member of the task force commanders' special staff. As such he performs special staff functions which pertain to antiaircraft artillery. He is a specialist and the commander should call on him for advice and recommendations in the use of antiaircraft artillery. Let us examine some of the items in which this officer would be interested, in the planning phase of an amphibious operation.

1. *Antiaircraft protection of the embarkation area.*—What units are to furnish this protection? Normally such protection is a responsibility of the embarkation area commander, and not of the task force commander. All units of the force, including the antiaircraft units, are generally too busy with final embarkation plans and preparations to assume any tactical duties or responsibilities.

2. *The amount and type of antiaircraft units to be assigned to the operation.*—This is directly proportional to the degree of friendly air superiority over the target area, the size of the target area, the den-

Antiaircraft and radar positions protect an invasion beach in Southern France. (Signal Corps photo.)

sity of defense required, and the amount of lift available. One of the greatest difficulties involved in planning arises from the general uncertainty of the shipping to be available and the lack of correct ships' characteristics. Antiaircraft units, particularly the gun units, have a tremendous amount of heavy and bulky equipment, and in planning the lift required for such units, the antiaircraft officer should have complete and accurate figures on the shipping.

3. *Antiaircraft protection of the convoy en route.*—The Navy is responsible for furnishing this protection with its organic antiaircraft weapons in the various ships. In many cases, however, the naval commander will ask for army antiaircraft units to augment this protection. The antiaircraft automatic weapons units (40-mm, mobile or self-propelled) are the types used for this purpose. To perform this mission the units must be deck loaded and plans must be made for the early debarkation of these units.

4. *The operational plan for the force after the landing.*—The antiaircraft officer must know this in order to plan logically for the use of the antiaircraft artillery in ground support missions. It must be kept in mind that antiaircraft artillery units have both primary and secondary missions. A typical order to antiaircraft artillery units might read as follows:

"Assist in the antiaircraft defense while afloat and upon landing provide antiair-

craft defense for the landing beaches, airstrips, beached craft, bridges, troop concentrations, supply installations, and other vital installations." In addition to the above primary mission, those antiaircraft units attached to the assault landing forces would have secondary missions. Among these might be included: antimechanized defense, assault on enemy pill boxes and other strong points, and anti-small-boat defense.

5. *A complete terrain study of the target area.*—The antiaircraft officer needs this to select tentative positions for his units. This terrain study is a necessity because it will influence the speed with which the antiaircraft defense can be established—a most important factor in all amphibious operations.

6. *The general plan of coordination between the ground, naval, and air units for the coordination and control of antiaircraft fire.*—This plan is a *must*, and should be formulated and published as early as possible.

a. Ground: Specific rules for the use of small arms and organic machine guns against hostile aircraft by ground units must be formulated.

b. Navy: Specific rules for the coordination of antiaircraft fire between army antiaircraft units ashore and naval antiaircraft units on shipboard must be published.

c. Air: Plans for the antiaircraft artillery coordination with air units with particular emphasis on recognition, identification and approach procedures for friendly aircraft must be formulated.

The control of antiaircraft fire is a major problem in all amphibious operations. The initial control is a responsibility of the Navy. The support aircraft controller exercises control over all air-

Convoy protection. (Signal Corps photo.)

Vehicles and supplies on a beach present a profitable target. (U.S. AAF photo.)

craft in the objective area, and assisted by the fighter director and fighter controller, directs fighter activities and disseminates air warning information, conditions of alert, and control of antiaircraft fire.

When the fighter control center (ashore), with the antiaircraft operations room (AAOR) is ready for operation, and at a time determined by the attack force commander, the control of antiaircraft fire passes from the support aircraft controller (Navy) to the air task force commander (Army). From that time, the control of antiaircraft and friendly fighter aircraft rests ashore.

7. *Shipping for antiaircraft units.*—The antiaircraft officer must insist that his units get a high priority of shipping space and that the units are loaded as a tactical entity; that is, armament, personnel, ammunition, and equipment are loaded together.

After getting all of the information possible on the above subjects, and tying down the details of coordination, the antiaircraft officer is ready to prepare the annex to the field order for the employment of the antiaircraft units assigned to the operation.

Each amphibious operation will differ in many respects as to the use of, and time of landing, of antiaircraft units. No two situations will be the same and each commander has his own ideas on how and when the antiaircraft units will be landed. It should be understood that the antiaircraft defenses of a beachhead should be built up early and quickly. There are definite types of weapons that help to achieve these requirements. These weapons are listed as follows:

1. *Antiaircraft machine guns.*—These form the initial antiaircraft defense of the beach. They must land early and certainly prior to the beaching of LST's. They are carried ashore by hand and set up to provide a line defense of the beach. In the Normandy invasion, provisional antiaircraft machine-gun battalions were

organized and went ashore in the initial waves.

2. *40-mm self-propelled units.*—These are the next antiaircraft units ashore. They are usually attached to the infantry assault units, in the ratio of one self-propelled battery to each battalion landing team. These units not only build up the antiaircraft defense ashore, but also fan out to protect the beach exits and their supported infantry units. When the tactical situation permits, these units revert to division or corps control and take their place in the integrated and coordinated antiaircraft defense of the beachhead.

3. *40-mm mobile units (towed).*—These cannot cross beaches until wire roadways have been laid. They are brought in "on call" and employed to expand the defense to an area, and to replace the self-propelled units which have the capability of moving inland over rough terrain.

4. *90-mm guns with organic radar.*—These must be ashore and in firing position to provide area defense prior to dark of D-day. Prior to the establishment of an air warning service, and the establishment of night fighter facilities, the 90-mm units are the primary means of defense against night bombings.

From the above, it can be seen that the antiaircraft defense of the beachhead is gradually built up. This build-up must be accomplished before large numbers of craft are beached and concentrations of craft, troops, vehicles, and supplies on the beaches present a profitable target to the enemy air. The object of the build-up is to assure the uninterrupted flow of supplies, vehicles, and troops over the beaches.

When the antiaircraft artillery defense is finally established ashore, one of the key parts of that defense will be the antiaircraft operations room. Stress must be laid on the prompt establishment of a simple and effective early warning service. Elaborate arrangements are not practicable and not desired. This early warning system is generally established by a signal air warning unit, equipped with long-range radar. This service is augmented by the antiaircraft artillery intelligence service. All of these warning services report into the AAOR, which is manned by a special antiaircraft operations detachment, if available. If there are no such units, an antiaircraft operations detachment must be improvised from the antiaircraft group or battalion headquarters personnel. The AAOR is normally established as close as possible, in the same tent or building, if practicable, to the fighter control center.

In summary, the following points are pertinent in the use of antiaircraft artillery in amphibious operations:

1. All phases of an amphibious operation require antiaircraft protection.

2. Antiaircraft automatic weapons units, self-propelled, are normally attached to the assault landing forces in the ratio of one self-propelled battery to each battalion landing team.

3. A major plan for air defense during the entire operations, thoroughly coordinated between ground, naval and air force units must be a part of the prior planning for an amphibious operation.

4. A high priority of available shipping space must be given to antiaircraft units.

5. The Navy is charged with the antiaircraft protection of the convoy en route to the target area. Army antiaircraft units generally augment this protection.

6. Antiaircraft units must be landed early, on call of the supported unit commander or on order of the ground force commander.

7. Antiaircraft defense of the beachhead is a "build-up." Machine guns first, then self-propelled units, then mobile units, and finally the gun units are landed, until an all around antiaircraft defense is established.

Naval Gunfire Support

A New Staff Function

Lieutenant Colonel R. D. Heinl, Jr., *United States Marine Corps*

AMONG the manifold new staff functions which modern amphibious war has brought to birth, none is more crucial to the success of operations, and none more truly reflects their joint nature, than naval gunfire support. It is a weapon which, in the Pacific alone, delivered over 125,000 tons of murderous fire, most of it almost at point-blank ranges, against bitter resistance. Without naval gunfire support, Tarawa could not have been stormed, the Marshalls and Marianas might still be Japanese outposts, and the assault of Iwo Jima would be unthinkable.

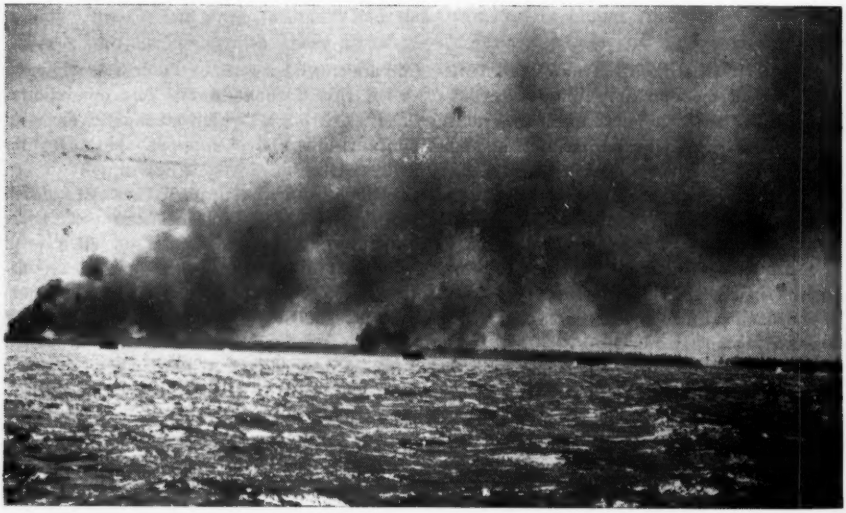
Like close air-support, another "war baby," naval gunfire (NGF) has necessitated creation of additional functions on all echelons of amphibious staffs, and in the Marine Corps (as well as to varying extents in the Army) naval gunfire has blossomed out as a fullfledged member of the special staff family. This article proposes to consider NGF in its staff context and to discuss the planning, execution and coordination of gunfire support as developed during the Pacific war.

At the outset, however, it might be well to review briefly the present staff organization by which naval gunfire support is assigned and controlled.

All fire support ships in any operation are organized in a fire support group, from which they are assigned on troop-request by the naval attack force commander, whose gunnery officer is charged with this responsibility. The operational chain through which troops seek and obtain naval fire support originates on the battalion level, and, much as in artillery and air support, there are naval gunfire liaison representatives with their own communication teams on each level of command up through regiment, division, corps and field army, if the operation is of that scale. Battalion teams, by whom most of the actual fire is called and controlled, contain forward observer elements, known as spotter teams, the regimental teams provide only liaison and coordination. Both battalion and regimental teams are headed by a naval officer versed in gunnery, the naval gunfire liaison officer (NLO's, or "Oboe's").

The division team is headed by the division naval gunfire officer, a Marine field officer, who is also an assistant G-3. He exercises control of the naval gunfire elements of the division much as the division artillery officer does his artillery. On corps and army levels, similar teams exist under corps and army naval gunfire officers of more senior rank and experience. From bottom to top it is the mission of naval gunfire staff officers to screen, coordinate and expedite requests for assignment of ships; to advise commanders on the correct use of naval support; to plan fires; and to keep communications in and functioning efficiently. From di-

vision on up, all this becomes increasingly complex, and when a request for support finally reaches the attack force gunnery officer (via the highest echelon troop naval gunfire officer present), it usually appears along with a consolidated group of similar requests laid out in advance for a given period (normally twenty-four hours), carefully considered, not only from the troop point of view, but in light of such naval factors as feasibility of communications, ammunition-reserves afloat and availability of ships from other duties.



LCMs are covered by naval gunfire as they approach shore. (Signal Corps photo.)

In marine divisions the organic assault signal company (ASCO) is the administrative and housekeeping organization which furnished all NGF teams. For army divisions, when employed in amphibious operations, somewhat similar provision is made by attachment of a joint assault signal company (JASCO), although the army T/O is rather more rudimentary in its nature, so that in the Pacific, army JASCO's usually had to be augmented provisionally in order to provide adequate naval gunfire teams to all elements of the parent division. In the marine organization, corps signal battalions furnish corps teams, while for any higher headquarters, a provisional organization is formed, based upon the needs of the situation. Army teams for corps and higher headquarters, when they have existed, have been entirely provisional.

Any naval gunfire plan for the assault of a defended objective, the plan, that is, for an opposed landing, falls into three phases in sequence as follows:

(1) *Preliminary bombardment:* This phase commences well prior to arrival of troops in the target area. It is not to be confused with prelanding fires delivered on D-day, but is a sort of siege by warships, a methodical probing for specific targets, most of which are at first indiscernible. Depending upon the number

and importance of enemy installations which must be destroyed, preliminary bombardment may last anywhere from two to ten days prior to landing. Carefully supervised and controlled from an amphibious command ship (AGC), this operation requires meticulous damage-assessment and target-bookkeeping, with every round of ammunition being placed where it can do most to facilitate later combat. To achieve satisfactory results, a thorough preliminary bombardment should accomplish the following:

(a) Destruction of coast-defense installations.

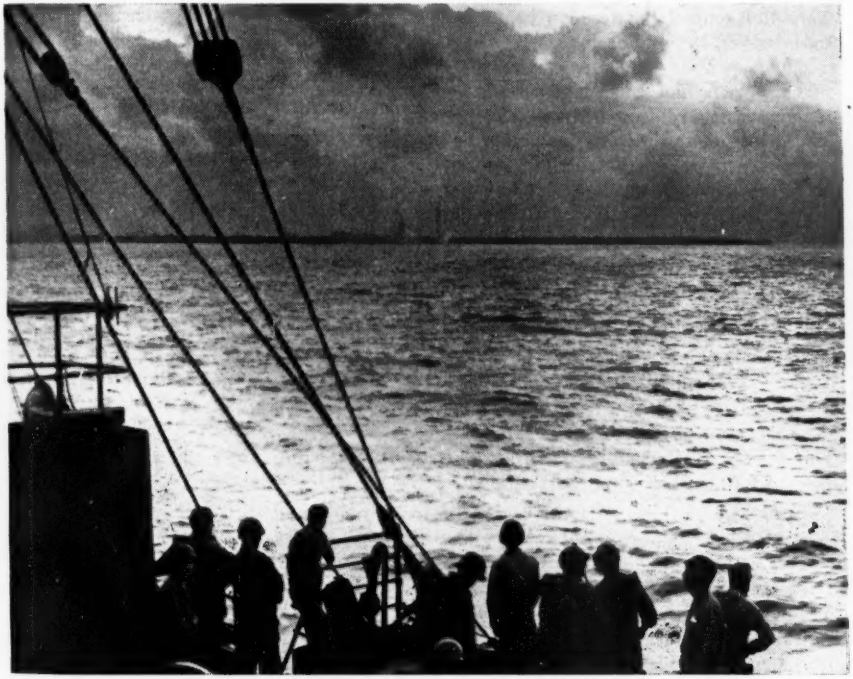
(b) Destruction of all weapons which can bring direct fire upon the beaches or transport areas.

(c) Destruction of enemy means of air defense (so that our own air-strikes may go in unimpeded).

(d) Destruction of fortifications which might obstruct or delay the landing (such as pillboxes, bunkers and blockhouses on or near the beaches).

(e) Stripping of camouflage, sand and vegetation in all critical areas in the immediate beachhead.

As may be seen, destruction is the watchword. So-called "area fire," except for stripping, is worse than useless. Targets are discovered by painstaking prelim-



Bursts from big naval guns on Butaritari. (Signal Corps photo.)

inary study and observation, and are then pinpointed and attacked, usually at very close ranges—and with very big guns.

(2) *D-day fires:* Fires on the day of actual landing are sharply divided into two internal sub-phases, (1) prelanding fires and (2) those prearranged for support after troops are ashore but before shore fire control parties can begin call-fire missions. Prelanding fires, which begin at dawn on D-day, usually consist of an intensification and concentration of preliminary bombardment with all attention being given to the beaches and immediate environs. Major carrier air-strikes normally are woven into the prelanding pattern of fire. Very shortly before the first wave hits the beach, fires lift inland and out onto the flanks. The timing and extent of these lifts is a very critical and delicate matter, especially if the anticipated opposition is strong. Fire must be kept close to the troop-advance, that is, fires must conform to the expansion of the beachhead, but our own people must not be injured or delayed in full exploitation of lines of advance. Usually the landing support is delivered in terms of a series of barrages or successive concentrations to front and flank, timed closely to the rate of advance.

(3) *The call-fire phases:* Once initial landings have been consumated, shore fire control parties get into operation, establish communication with ships assigned to the support of their battalions, and commence firing on such targets as require attention. Analysis of communications in opposed landings indicates that as much as an hour may elapse after the landing of the first wave before call-fire missions begin coming in. The balance of close support naval gunfire in the operation continues on a call basis, although attack of deep and distant targets beyond the zone of immediate interest of assault units continues in much the same manner as critical point-targets were attacked during preliminary bombardment.

Throughout all these phases, the naval gunfire plan divides itself into two major parallel tasks: preparation of an adequate and practical NGF communication plan both of forces afloat and for troops; and completion of what might be called the firing or attack plan, i.e., schedules of fire, areas of responsibility for each ship, assignment of appropriate ships to direct support of troop-units, etc. Under ideal conditions, the troop and naval NGF plans should be prepared jointly by the senior troop naval gunfire officer and the attack force gunnery officer, and all aspects of the above two tasks should be examined thorougly by both officers so that no plan is issued, either by troops or forces afloat, which does not represent a joint effort and concensus of both staff officers.

The actual sequence of planning is in reality, therefore, a give-and-take process between the troop staff (naval gunfire officer) and the naval staff (gunnery officer).

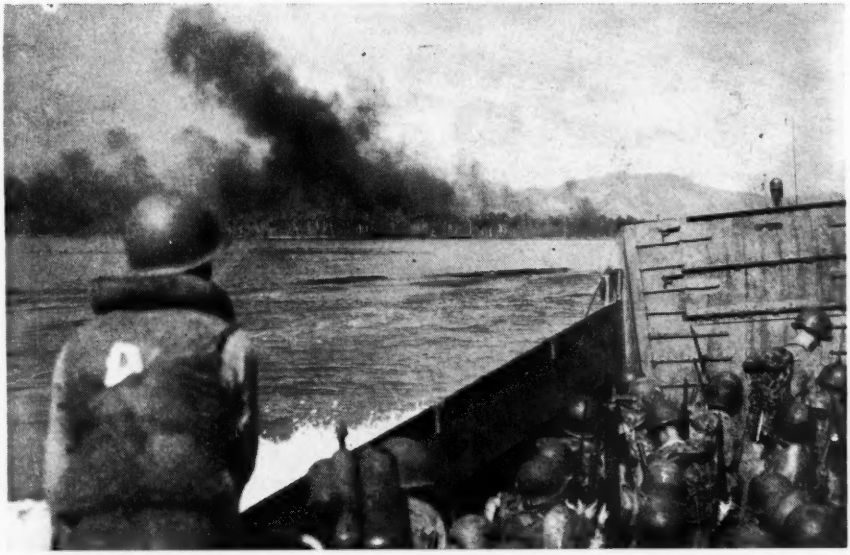
The whole plan begins with a troop request for overall support throughout the operation. This is prepared by the top landing force naval gunfire officer, and is based upon similar requests submitted up the chain of command from the major subordinate units of the landing force. What the naval gunfire request amounts to is this: a broad estimate from the troop point of view of what naval gunfire can be expected to do during the operation; a tabulation of the means and time required for preliminary bombardment (expressed in terms of ship-days and ammunition needed for reduction of known or suspected targets); and a proposed general plan for the employment of naval fire support if the request is met.

Upon receipt of the naval gunfire request, the naval staff and the troop staff review it in detail, and conclusions are reached as to how much of what has been

requested can be granted. Sometimes called "the bargaining phase," this stage of the planning results in agreement as to what naval means will be available and, in general, how these will be used. It should be remembered, however, that bargaining is not confined solely to quantity and types of ships to support the landing force, but extends to such other equally important matters as ammunition allowances for preliminary and D-day bombardments; allocation of sufficient (and suitable) frequencies for efficient gunfire communications; and availability of communications outlets aboard command ships (AGC's). Of all these, the most difficult problem will usually turn out to be the frequency-plan, for in this respect naval gunfire support has to pit itself against the requirements of every other vested interest in the landing. There will never be enough frequencies to go around, and it is the naval gunfire officer's job to see that his specialty gets a fair share.

Upon conclusion of the "bargaining phase," the joint efforts of the troop naval gunfire officer and the gunnery staff should turn to detailed planning of fires and communications.

For planning preliminary bombardment, the prime requirement is early and accurate information as to the enemy's defensive organization of the landing area, since ammunition allowances for this phase are normally based upon target-analysis studies which indicate the scope of the job. Large-scale, vertical aerial photographic coverage and good maps[1] are necessary. Each major fire-support ship must be assigned an "area of re-



Leyte Island. Smoke is from naval bombardment. (Signal Corps photo.)

[1] Maps must show not only the terrain and fortifications ashore, but the hydrography offshore, upon which ship placement and assignment of responsibility depend. The standard navy shore-bombardment chart (1:36,000) includes all necessary detail.

sponsibility," that is, a section of the target-area which will be that ship's responsibility throughout the bombardment, and in which all targets have been especially catalogued, assigned priority and

Naval guns set fire to shore installations as troops wade ashore. (Signal Corps photo.)

studied by the ship's gunnery staff and her spotting-planes' pilots. The waters offshore must be divided into fire-support sectors. Final air-strikes must be coordinated so that they do not unduly interfere with progress of the preliminary bombardment.

As has already been indicated, the principal concern in the plan for D-day prelanding fires and the prearranged landing support is accurate scheduling of the rolling barrages which will spearhead the front and flanks of the landing. Shipplacement is likewise critical, since fire-support ships will usually have to be stationed in the boat-lanes themselves, and, in any case, lines of fire will have to allow for movements of friendly troops and amphibious craft. In the D-day plan, as well, communications first arise as a major problem, for it is at this time that shore fire-control parties (SFCP) enter the picture. Every expedient must be employed to enable early communication between SFCP and direct-support ships,

since no rolling barrage, however well-timed, can take the place of call-fires against the targets which count.

The balance of the troop-plan consists of instructions for naval gunfire elements of the landing force: safety-limits, restrictions on fire, procedures for coordination of fires, daily routines for relief and assignment of fire-support ships, etc. The naval gunnery plan, on the other hand, from here on in embodies details and instructions pertaining only to the forces afloat, such as: procedure for re-ammunitioning, antisubmarine measures, mine-clearance information, etc.

After all the foregoing planning has been completed by the joint staffs, the respective gunnery (Navy) and naval gunfire (troop) annexes may be issued. The former is an annex to the naval attack force operation plan, and is, in fact, the *directive* from which all information in the troop annex stems. The only directives, as such, in the troop annex are those which govern the operations of the troop naval gunfire teams. The troop annex, in Marine Corps operation plans, is an annex to the landing force operation plan. Army practice sometimes follows that of the Marine Corps, but more often makes naval gunfire an appendix or attachment to the field artillery annex. Aside from any other questions presented by this practice, it does tend to make the field artillery annex bulky and complicated, since a correctly-prepared corps NGF annex (which may include anywhere from six to ten appendixes of its own) in an opposed landing will often exceed thirty pages in length.

The highest-level troop annex should have very wide distribution, normally much greater than that of the operation plan itself. If carefully prepared, it can usually serve, in reproduced and authenticated form, as the NGF annex for all subordinate operation plans down to and including division level. Below this point, however, no necessity exists for use of the "big-picture" annex, and a suitably condensed annex will serve for RCT (Regimental Combat Team) and BLT (Battalion Landing Team) plans.

Perhaps the most important appendix to the troop NGF annex—at least from the lower units' viewpoint—is the one dealing with shore fire control communications. It must deal with a variety of subjects, and should be so constructed that it may be given separate distribution right down to RCT and BLT levels as a communications-guide for all NGF elements of the landing force. Some of the most important data are: frequencies, code-names and calls required in NGF support; radar beacon procedure; D-day frequency plan: wire plan for lines and switchboard use in coordination of supporting arms (air, artillery and NGF). The absolutely essential nature of all this mass of detail proves that nowhere more than in naval gunfire support is Admiral Mahan's adage correct: "Communications dominate war!"

Execution of the naval gunfire plan requires the services of troop naval gunfire officers from the very outset. During preliminary bombardment the highest echelon naval gunfire officer usually accompanies the fire-support group to the target, and works conjunctly with the naval gunnery staff in carrying out the bombardment plan. His principal role is to represent the interests of the landing force in any modification or alteration of the plan as previously worked out; he must see that every round fired is devoted to the best interests of the troops. Secondly, he supervises the recording of damage-assessment data, and compiles all additional intelligence which comes to light in the course of the bombardment. On the morning of D-day—very early—he transfers by open boat to the commandship of the landing force, upon its arrival in the target-area, and assumes his D-day duties on the landing force staff.

Throughout the D-day prearranged fires, the naval gunfire officers of corps and divisions are mainly concerned with decisions and action relative to the lifting or refiring of schedules so that the prearranged fires conform to the actual progress of the landing. Early establishment and maintenance of shore fire-control communications are also crucial. After the beachhead has been secured, work settles down into the call-fire routine. Requests for ships and frequencies are screened, processed and forwarded. Reinforcing and deep fires by heavier ships are kept going. Prearranged fires are coordinated for each attack. Air-spotting services are provided as necessary. Starshell illumination is planned each night for the front line. Casualties to naval gunfire teams and their equipment are somehow made good. It is a twenty-four hour grind that never ceases.

Up to this point, little has been said about a controversial subject, coordination of air, artillery and naval gunfire. One of the main reasons that it is controversial is that many of those who propound the most decided dogma know least, practically speaking, about the mechanics and procedures for obtaining and controlling air and NGF support. Let us canvass the situation.

So far as is known, the whole concept of close special coordination of these supporting fires developed from two sources.

The fact that artillery and naval gunfire interfered with and sometimes endangered air-strikes (or vice versa) is said to have been first noted during the Marshalls operation, as a result of which the now current procedures for lift or modification of fires during air-strikes[2] were first instituted. The idea that prearranged fire-plans should represent a careful and economical integration of air and naval gunfire with artillery fires, and that such coordination should be vested in a single agency, arose in the XXIV Corps Artillery, then commanded by Major General T. E. Bourke, USMC. At grassroots, these two principles still constitute the valid justification and delimit the scope of coordination of the supporting arms, despite many tugs-of-war and staff wrangles which have often used the term "coordination" as a stalking-horse for absorption or complete control for planning, training, and operations of all three arms under one, usually the Field Artillery. In non-amphibious staffs, there exists some justification for such a consolidation, since artillery represents a well-trained and established agency, but in amphibious staffs, air and naval gunfire are equally vested and represented, and control over these arms by an artillery representative should extend after the landing only to bona fide coordination as such.

Fortunately the workable limits of coordination seem by now to have been well defined and understood, with the result that such hybrid institutions as the "Target Information Center" or "TIC"[3] of the last operations of the war have yielded place to more modest but more practical expedients.

That naval gunfire support, by the end of the war, had reached a position of equality, in amphibious operations, with such powerful arms as air and artillery, speaks much for its beanstalk-like growth. What was, in 1942, an untried and obscure specialty, had, by 1945, become a *sine qua non* of amphibious assault, and from a staff point of view, a complex function requiring highly-trained management. Those who plan amphibious operations would do well, therefore, not to forget their naval gunfire.

[2] The plans "Victor" and "Negat," familiar to all interested readers of Pacific amphibious operation plans.

[3] A center attached to corps or higher headquarters, which essayed to duplicate the functions and records of artillery S-2 and G-2 sections by recording all known targets, and from which, by complex rituals, the supporting arms were "coordinated."

The

Food Service Program

Colonel J. C. Longino, *Quartermaster Corps*

DISTRIBUTION OF FOOD CONSERVATION DIRECTIVES.—*a.* Effective this date all directives on food conservation issued by the War Department or by headquarters of the major commands will contain a proviso to the effect that copies of the directive, appropriate extracts thereof, or those prepared by subordinate commands based thereon, will be made available to and kept on file for ready reference in each actively operated mess, ration breakdown point, commissary, subsistence warehouses, food supervisors' offices, food service school, market center, depot, post bakery, central meat cutting plant, central pastry bakery, rail and marine facility concerned with the feeding of troops, and in all other places concerned with procurement, storage, issue, preparation, and inspection of subsistence; and where appropriate and feasible each directive will be supplemented by suitable posters for display in each kitchen and/or dining room.

b. Strict compliance with all food conservation directives by all military personnel concerned is enjoined.

The above paragraphs, quoted from War Department Circular number 214, 18 July 1946 was received by the editor shortly after this article was submitted. Its publication herewith is deemed appropriate.—THE EDITOR.

THE welfare of the individual soldier, and therefore the welfare of the Army, more intimately than or any other single thing depends upon proper feeding. More often than not it is the simple or obvious thing upon which we miss a bet and, as concerns Food Service, I think we must admit the fact. Stated simply, it is that we have had no integrated system of food service from top to bottom. The chain of responsibility was broken at its weakest link—mess management and operation. The Quartermaster General was charged with Research and Development, specifications, the determination of requirements, procurement and storage and distribution, but at that point his authority ended, and the preparation and serving of food to the soldier became a command responsibility.

Extracts of the Hennessy Report, by order of the Chief of Staff, were made required reading by every officer in the Army. Where were the deficiencies found? It is not my purpose to defend the Quartermaster Corps nor to condemn any one else. We are after the facts and the facts are that the deficiencies were primarily in the preparation and service of food—the area of command responsibility.

Commanders have a great many responsibilities. Perhaps the greatest responsibility of all, however, is that of seeing that the food the soldier eats is palatable, acceptable and adequate and that it is not wasted. It is an individual responsibility

which has not been properly discharged because of a lack of appreciation of its importance and of the absolute necessity for close *personal* supervision of all activities connected with the mess. Give the soldier better food and you make him a better soldier—a better citizen. Furthermore, conservation is a by-product of efficient mess management and operation and the importance of that to a half-starving world is beyond any words of mine.

On the whole, the American Army was the best fed army in the world. We know exhaustive research and development were conducted to make it so. We know that the products of that research and development were rations superior to those supplied the troops of any other nation. But we also know that the end product—namely, the food eaten by the soldier—sometimes fell far short of what it should have been.

Troops have gone hungry while food of the finest quality was being wasted because of poor preparation and poor mess management. Troops have wasted food because of lack of variety. Troops in foxholes on the front lines have gone without hot food because it was easier to supply them with a few cans. Troops have suffered because, for one or more of several reasons, rations were unbalanced. Troops have subsisted for long periods of time upon C or K rations which were designed and intended for *emergency use only* and not for extended periods.

As concerns operational rations, with the effective and indispensable support of Army Ground Forces and Army Service Forces, a thirty-day conference was held which had for its objective the compilation, analysis and preservation of wartime experience. Attending the conference were railhead and supply point officers, S-4's, division, corps, army and base headquarters from all theaters, Army Ground Forces officers, Quartermasters, Transportation officers, Engineers and Medical officers—an exceptionally fine cross-section of experience. The work was divided between four major committees:

Packaging and Distribution
Rations
Equipment and Refrigeration
Selection and Training.

The conference made 218 recommendations, of which I should like to quote subrecommendation five of recommendation number 215:

"That a course be included in the Command and Staff College covering Command responsibility for food service, proper utilization of the various types of rations, functions and duties of the division or similar level food service supervisor and supply of rations."

The recommendations of the conference are being studied. Many of them are being implemented; others will form the basis for intensive research; all of them will be given the utmost consideration.

Food is a most important matter. Every officer in the Army must be made aware of that fact and of his individual responsibilities in connection with it.

Let me illustrate what I mean. During the war enough bakers and cooks were trained to serve an army of 16,000,000 men and yet a survey made of the nine service commands in 1944 showed that only fifty-one per cent of mess personnel had been trained at schools for bakers and cooks. By 1946, the number had shrunk to only twenty per cent! It is obvious that much of the trained personnel had been frittered away through mis-assignment. Proper exercise of responsibility in the utilization of this trained personnel would have gone far towards the prevention or elimination of the conditions reported by the Hennessy Committee.

Transition periods are always difficult. Fortunately, the Hennessy Committee made its investigation at the worst possible time for the Army. I say fortunately, because

I earnestly hope that from their adverse report will come the constructive action so badly needed.

Included in the report were research and development, requirements, procurement, storage and distribution, training, supervision, and the preparation of food.

The research and development program on rations was one of the most comprehensive and exhaustive ever undertaken. With the active collaboration of the National Defense Research Council and the cooperation and assistance of leading hospitals, universities, food companies and food experts of the country, specifications were developed which produced rations of the finest quality and excellence. They were superior to those developed by any other country. They were nutritionally balanced and scientifically designed to meet the soldier's peculiar needs.

The computation of requirements was a simple matter prior to the war, but it was vastly different in July 1945 when the Army had reached an unprecedented strength of 8,400,000, and an additional 6,200,000 had to be included for the Navy, Marines, Allied personnel and prisoners of war. Including the liberated people the Army was providing subsistence for an estimated 96,000,000 people—a staggering figure. An all-out effort was required to meet it and to fill the 12,000 mile pipe line into the Pacific. It should be noted that the Army was always conservation minded. As early as 1942 Food Study Number 1, a comprehensive, Army-wide survey was made to reduce requirements and eliminate waste.

As concerns procurement, let me quote from the Hennessy Report itself:

"The food purchased for army use is good quality, standard merchandise of the type normally used by American people of moderate or greater wealth. In general, the merchandise can be classified as 'extra standard' grade. There is no doubt that this merchandise represents the greatest economy in food as it excludes low grade material which would be wasted because of its inferior quality and also excludes very fancy goods which are obtainable only at a premium price."

Deficiencies were reported in storage and distribution. Storage facilities were generally adequate, but excess stocks were on hand and some spoilage resulted from improper handling and storage. The huge requirements, the world wide dispersal of forces, the great distances involved, and limited shipping facilities made the accumulation of excesses at some points inevitable. Unpredictable troop movements and later the hurried demobilization were contributing factors, and precipitous loss of trained personnel after VJ-day also played a big part in creating the conditions reported by the Committee.

That brings us down to the area of command responsibility: training, supervision and the preparation of food. The Committee found training courses and methods generally adequate, but scored the fact that, at the time of their survey, they found only twenty per cent of the personnel in messes had been trained. Supervision, in many cases was by untrained and unqualified officers performing the duty perfunctorily in addition to other duties. There was inefficiency, there was waste and poorly prepared food was being served to the soldier.

Where did the trouble and responsibility lie? It is not my intent to indict command. It was faced with emergency conditions and the same demoralizing demobilization cited above. Let me repeat, the trouble was that we had no integrated system of food service. The chain of responsibility was broken at its most critical point and in the breaking the responsibility of mess management and operation was adulterated in the maze of command responsibilities of which it became just one among many.

The Report of the Hennessy Committee

was referred to the Quartermaster General for recommendations. The solution of the fundamental problem was to bridge the break in the chain of responsibility and to establish all details of food service in true proportion and consideration to their importance.

The following were the conclusions and recommendations submitted by the Quartermaster General through channels to the Secretary of War.

Conclusions: After thorough consideration of all the phases of food service encompassed in the Committee's report, it is concluded that:

a. Research and development were adequate and effective.

b. (1) Requirements, viewed in proper perspective to the magnitude and complexity of the job done, were handled with reasonable efficiency.

(2) Excesses were inevitably created by the sudden ending of the war and rapid demobilization.

c. (1) Storage and distribution were complicated by the unexpected movement of troops and the accelerated and unplanned demobilization.

(2) Local excesses were largely created by the unexpected movement of troops, or to effect economies in storage and transportation. A stock control system was set up, however, to control stocks at post, camps, and stations and such stocks were reported to the Quartermaster General and included in supply computations.

(3) Storage facilities were adequate.

(4) Some spoilage in the storage and distribution of foodstuffs was inevitable. The quantities procured, the distances shipped, and the perishable nature of many items plus human failures were largely responsible. Figures are not available to determine the matter quantitatively, but it is not believed that it was unduly large.

d. (1) Training programs and facilities were adequate.

(2) Trained personnel was dissipated because of low rates of pay, unattractive working conditions, and other similar factors.

(3) Priority to combat replacements was also a big factor in mis-assignment in theaters of operation.

(4) Fuller utilization of training facilities and of trained personnel should be required of respective commanders.

(5) The Inspector General should be specifically charged with investigations to assure full compliance with all War Department directives pertaining to food service.

e. (1) Supervision of food service was not satisfactory because it was frequently performed by untrained personnel on a part-time basis.

f. (1) Preparation of food was not uniform but varied in direct relationship to the morale, training and experience of the personnel and to the interest and efficiency of the Unit Commander.

(2) Preparation in many instances fell short of the desired results in palatability and acceptability to the soldier because of mis-assignment of culinary personnel resulting from inadequate pay for work required in relation to other company duties.

Recommendations: It is recommended that: *a.* A Quartermaster Corps officer of suitable rank be permanently assigned, and included in the appropriate T/O and E's, to the staff of the Quartermaster of each army and separate corps, and each division or separate brigade, respectively, whose sole duties will be the supervision and direction of the Food Service Program, mess operation and sanitation, and the conservation of food within the Command.

b. A Quartermaster Corps officer in the grade of 1st Lieutenant be permanently assigned, and included in the appropriate T/O and E's, as assistant executive officer, on the staff of each regiment, group

headquarters, division artillery, and separate battalion, respectively, whose sole duties will be the supervision and direction of the Food Service Program, mess operation and sanitation, and the conservation of food within the organization.

c. Company, and similar organization, mess sergeants be increased in grade from staff to technical sergeant and that the grades for cooks be raised from T/4 and T/5 to T/3 and T/4 respectively.

d. Minimum qualifications of aptitude and intelligence be established for all culinary personnel.

e. All food supervisors, mess sergeants, cooks and bakers be graduates of the prescribed courses of instruction, and that the Inspector General closely watch the execution of command responsibility in this regard.

f. The cooks and bakers schools be returned to the jurisdiction of the Quartermaster General, except for administration.

g. All newly commissioned officers be required to attend prescribed courses in mess management and operation.

These recommendations were approved in their entirety by the Secretary of War who directed that they be put into effect. Pursuant to that directive the Quartermaster General prepared the implementing circulars and directives and submitted them without delay. They are now in the hands of the General Staff.

Will this work? Will command accept this extension of responsibility and authority to the Quartermaster General? General Devers, the Commanding General of the Army Ground Forces, said at the opening exercises of the Food Conference:

"I was told only recently in our procurement that everything we do about food is fine, that is, up to the kitchen door and then we butcher it. The management and everything else is terrible. You have to be the leaders there. You have to go into the kitchen and see that the management and organization is there and tell us if we do not handle it right. We have to do it, but we have to get the leadership from you, and I am depending on you gentlemen here to give us the lead and tell us how we can do it to get the maximum benefit from the minimum amount of energy."

When asked later if he meant what he said, he replied that he not only meant it, but that he would like to repeat and reemphasize it.

At this point, let me make clear that the program I have described is still a proposed program although, as has been stated, it has been approved by the Secretary of War. Whether or not the General Staff will modify or change it remains to be seen. But something has got to be done, and it is difficult to see any other solution. To date only one of the recommendations has been put into effect. The Schools for Bakers and Cooks have been redesignated Food Service Schools and have been returned to the jurisdiction of the Quartermaster General.

Do these changes alter, or eliminate command responsibility? Not at all. That is the major difference between the solution proposed by the Quartermaster General and that of the Hennessy Committee. The latter would have taken the responsibility and authority away from you and away from the Quartermaster General and placed them in a Catering Corps entirely outside of command channels—a complete breach of the fundamental principles of military organization. By contrast, under the proposed system, command responsibility is retained, but the Quartermaster General becomes responsible for the supply of trained personnel; expert food service supervisors are provided in a staff capacity at all echelons of command; and the Quartermaster General is empowered to inspect and check performance down to and including the company mess. I believe the system, when properly implemented with qualified personnel, will work; that it will eliminate the deficiencies

of the past; and that it will take a big burden off the shoulders of all commanders.

By raising the pay and status of food service personnel, providing career possibilities and eliminating untrained and unqualified individuals, the foundation for high morale and efficient mess operation and management is laid.

The Quartermaster Committee on Food Research is composed of the foremost food technologists in the country. The Subsistence Laboratory at Chicago is one of the finest in the world. The Quartermaster General has the active collaboration of the Surgeon General, the Department of Agriculture, the National Academy of Science, outstanding industrial and medical laboratories, various foundations such as the American Meat Institute Foundation and the American Dry Milk Institute—the food science brains and facilities of America working to give the soldier the very best rations that can be devised.

With the return of the Bakers and Cooks Schools to its jurisdiction, the Quartermaster will train and provide expert food supervisors for all echelons of command and will train as many mess sergeants and bakers and cooks as may be needed. It will take some time to do this, but in two or three years the objective of *trained personnel only* should be fully met.

The operation and management of messes will remain a command responsibility, but the Quartermaster General is placed in a position which will enable him to render more effective and timely assistance.

It cannot be too greatly stressed that it is and will continue to be the duty of every officer to see that the messes of his command are closely supervised and properly managed, that only trained and qualified personnel are employed, and that all directives of the War Department on food conservation are carried out. Regardless of innovation, it is only by the proper discharge of this individual responsibility that our Army can be given the sort of food service it should have.

Better food service is the best and most direct route to better health, morale, and efficiency. Last, but by no means least, it is indispensable to the elimination of waste and the conservation of precious food.

These things can be achieved. They must be achieved. We are convinced they will be achieved if the food service program is put into effect.

The American Army was unquestionably better fed than any in history. However, feeding in combat can never be like that in garrison or cantonment, nor remotely like home cooking. Field rations must be nonperishable, compact, and easily carried by the individual soldier. The problem of providing troops with appetizing food has plagued armies down through the centuries. The development of field rations for the United States Army in this war was almost revolutionary. The combat rations "C" and "K" were given a range of variety that combat troops would not have dreamed of a few years ago.

General of the Army George C. Marshall

Post-War

Naval Organization

—— *The Navy Department*

Captain Miles R. Browning, *United States Navy*
Instructor, Command and Staff College

THIS is the first of three articles by Captain Browning on the Post-War Naval Establishment. The two succeeding articles "The Shore Establishment" and "The Operating Forces" will appear in subsequent issues of the Military Review.—THE EDITOR.

General

Since the end of World War II, the United States Naval Establishment has undergone a considerable reorganization. The lessons learned in four years of warfare extending into every ocean on the face of the globe have been the catalysts in the transformation. Unnecessary offices and functions have been eliminated; clumsy and inefficient procedures have been either cleaned up or cleaned out; new administrative and command echelons have been inaugurated wherever the spotlight of the recent war has shown them to be desirable. The framework of the entire establishment as it now exists is a highly flexible one; it is capable of instant expansion—or contraction—and it is adaptable to any and all foreseeable contingencies in the years to come.

The United States Navy—that is to say the United States Naval Establishment—comprises three major components which are, generally speaking, separate from each other both organizationally and geographically. These are:

a. The *Navy Department*,

b. The *Operating Forces*, and

c. The *Shore Establishment.*

The Navy Department and the Shore Establishment are the supporting members of this team; the Operating Forces are the ball-carriers. The only reason for the existence of the Navy Department and the Shore Establishment is to provide service and support for the Operating Forces.

The Navy Department is, of course, the central headquarters of the entire organization. In it originate all broad directives of policy, high level administration, command and logistics to both the Operating Forces and the Shore Establishment.

The *Operating Forces* comprise two main elements, viz: the *Fleets* and the *Sea Frontier Forces.* There are a number of other minor constituents of the Operating Forces which are not of sufficient importance to mention at this point.

The *Shore Establishment* includes all field installations and activities controlled by the Navy Department, both within the continental limits of the United States and in outlying territories, whose missions embrace supply, repair, original and replacement equipping, maintenance and like support of the Operating Forces.

Central Executive Agency

Under the President, the *Secretary of the Navy* is charged by law with the supervision and direction of the entire naval establishment. The Secretary necessarily

delegates a considerable measure of his authority to top-level executive assistants. These latter are of two distinct types: *Naval* executive assistants and *Civilian* executive assistants. For his immediate Naval assistants, the Secretary has a *Command* assistant—the Chief of Naval Operations—and a number of *Technical* assistants—the Chief of the various technical Bureaus of the Navy Department, the Judge Advocate General and the Commandant of the Marine Corps. In time of war, the United States Coast Guard becomes a part of the Naval establishment and the Commandant joins the list of advisors in a capacity similar to that of the Commandant of the Marine Corps. For his Civilian executive assistants, the Secretary has the Under Secretary, the Assistant Secretary and the Assistant Secretary for Air. All together, they and the Secretary comprise one integrated controlling head for the entire naval organization of the nation. The principal mission of this head is to implement the fundamental naval policy of the United States, viz., "To maintain the Navy in strength and readiness to uphold national policies and interests, and to guard the United States and its continental overseas possessions."

To accomplish this mission, four prime tasks present themselves to the Secretary and his executive assistants. These tasks are:

Policy Control: i.e., to interpret, apply and uphold the national policies and interests in the development and use of the Naval Establishment.

Naval Command: i.e., to command the Operating Forces, and to maintain them in a state of readiness to conduct war; and to promulgate to the Naval Establishment directives embracing matters of operations, security, intelligence, discipline, naval communications, and similar matters of naval administration.

Logistics Administration and Control: i.e., to coordinate and direct the effort of the Navy Department and the Shore Establishment in order to assure to the Operating Forces the development, procurement, production and distribution of material and facilities, and the procurement and assignment of personnel.

Business Administration: i.e., to develop and maintain efficiency and economy in the operation of the Naval Establishment with particular regard to matters of organization, staffing, administrative procedures, the utilization of personnel, materials and facilities, and the budgeting and expenditure of funds.

The decentralization of duties and the allocation of functions among the Secretary and his executive assistants follow the natural avenues of insuring that to each of these four prime tasks there shall be given adequate and continuous attention and direction. Pursuant to this principle, we find that the Secretary reserves to himself the accomplishment of the first task—*Policy Control*—because the final responsibility for what the entire organization does and for the results which it accomplishes rests by law upon his shoulders alone. The second task—*Naval Command*—is assigned to the Naval Command executive assistant, the Chief of Naval Operation. The third—*Logistics Administration and Control*—involves two distinct fields of responsibility and it is, therefore, divided for appropriate assignment. This division follows naturally from the fact that Logistics Administration and Control embraces:

(a) *Consumer Logistics*—planning for the needs of the Operating Forces and the distribution of the supplies, material and personnel to fill those needs.

(b) *Producer Logistics*—producing or procuring the supplies, material, and personnel for distribution to the Operating Forces. The first of these—Consumer Logistics—is a naval command respon-

sibility and is assigned to the Chief of Naval Operations; the second—Producer Logistics—is delegated to the civilian assistants, the Under and Assistant Secretaries. Close collaboration is required and provided for between the naval and civilian assistants in the discharge of their logistical responsibilities, for there must obviously be maintained a continuous "cause and effect" relationship between the two fields of effort. The Chiefs of the Navy Department Bureaus, the Commandant of the Marine Corps, and, in war, the Commandant of the Coast Guard, function as the active agents in logistic matters for both the Chief of Naval Operations and the Under and Assistant Secretaries.

The fourth prime task—Business Management—is assigned to the civilian assistants. In its accomplishment, the Under and Assistant Secretaries exercise direct authority over the Bureau Chiefs and the Marine Corps and Coast Guard Commandants, and through them, over the Shore Establishment. In respect to the Operating Forces, however, they do not exercise any direct control; they are required to collaborate with the Chief of Naval Operations in evaluating and improving business administration in the Operating Forces.

The Chart, page 37, outlines the overall functional organization of the United States Naval Establishment. In the integration of the central executive agency which we have been discussing, provision has been made for the fullest possible participation on the part of both the naval professional executive assistants and the civilian executive assistants. To each are allocated those functions for which he is best fitted by virtue of professional training and experience or industrial and business background.

The Navy Department

In the foregoing paragraphs, we have briefly traced the overall organizational framework of the entire Naval Establishment, and the general scheme of decentralization of authority by means of which the Secretary of the Navy distributes his responsibilities and duties among his top-level assistants. A somewhat more detailed breakdown of that system is required to make clear the departmental organization and functioning.

The Secretary of the Navy, as we have noted, is responsible directly to the President for the supervision of all naval matters. He retains under his immediate cognizance any activities of the Navy Department which involve vital relationships with principal government officials and with the public. He supervises personally the following boards and offices:

Facilities Review Board
General Board of the Navy
Joint Army and Navy Board
Joint Economy Board
Office of Naval History
Office of Public Information
State-War-Navy Coordinating Committee.

The Under Secretary of the Navy is charged with general supervision of Business Administration throughout the Naval Establishment. Through a system of direction and inspection, he insures economical and efficient performance in consonance with sound business and industrial practices. He supervises directly the following:

Administrative Office
Industrial Survey Division
Office of Budget and Reports
Office of Fiscal Director.

The Assistant Secretary of the Navy is charged with that part of Producer Logistics which relates to the promulgation of policies and general procedures governing the procurement and production of matériel and facilities, including petroleum and naval petroleum reserves;

the determination of stock levels and replenishment requirements and the administration of inventory control systems, all in collaboration with the Chief of Naval Operations; the correlation and programming of material research, experimental, test and development activities. He supervises directly the following:

Army and Navy Munitions Board
Lend-Lease Liaison Office
Material Office
Naval Petroleum Reserves
Office of General Counsel
Office of Judge Advocate General (for taxation matters, settlement of claims, and legislation not dealing with personnel.)
Office of Research and Inventions
Requirements Review Board.

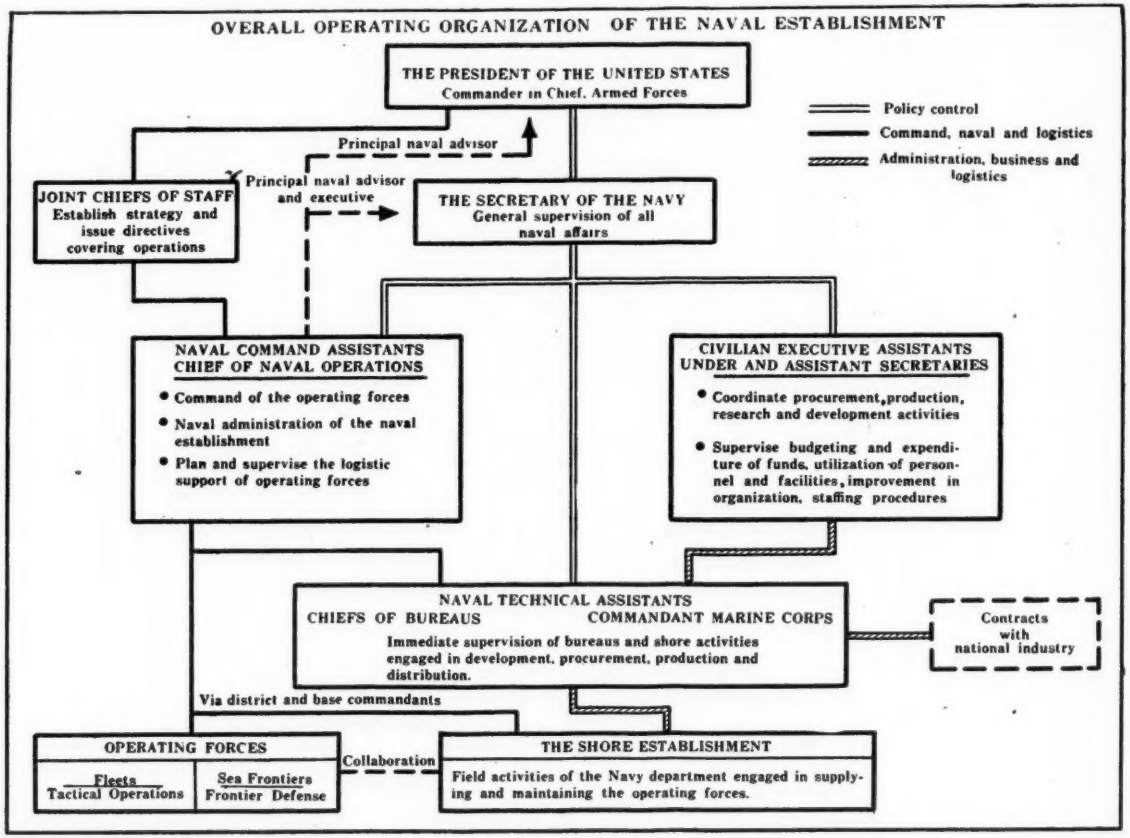
The Assistant Secretary of the Navy for Air is charged with responsibility for all aeronautic matters including the coordination of naval aeronautics with other governmental agencies. In addition, he is responsible for that part of Producer Logistics which relates to the procurement and administration of personnel (including labor relations in the plants of private contractors). He exercises direct supervision over the following:

Navy participation on the Aeronautical Board
Navy participation on the Air Coordinating Committee
Board of Decorations and Medals
Board of Medical Examiners
Board of Review. Discharges and Dismissals
Joint Army and Navy Committee on Welfare and Recreation
Naval Clemency and Prison Inspection Board
Naval Examining Boards for Line and for Supply and Medical Corps
Naval Retiring Board
Naval Retiring Review Board
Office of Industrial Relations
Office of Judge Advocate General for all matters not supervised directly by the Assistant Secretary of the Navy
Office of War Savings Bonds.

The Chief of Naval Operations is charged with the Naval Command of the Naval Establishment. He commands the Operating Forces. He is the principal naval adviser to the President and the Secretary of the Navy on the conduct of war. He is the principal naval adviser and naval executive to the Secretary of the Navy on the conduct of the activities of the Naval Establishment. He issues to the Navy Department and the Shore Establishment directives concerning operations, security, intelligence, communications, discipline and like military matters. He is charged with Consumer Logistics and is responsible for planning and forecasting the needs of the Operating Forces for material, personnel and supporting services. He informs the Bureaus and offices of the Navy Department and, through them, the Shore Establishment, of what is needed and when and where. He defines the naval characteristics of materials and the naval training required for personnel for service in the Operating Forces. He issues such directives as may be needed to insure satisfactory accomplishment. Throughout, he collaborates with the Assistant Secretary of the Navy in expediting the Producer Logistics to fulfill the Consumer needs and in evaluating and improving the policies and procedures governing determination of stock levels, replenishment requirements, and administration of inventory control systems.

The Chief of Naval Operations is assisted by a principal staff comprising a Vice Chief, six Deputy Chiefs as listed below, and an Inspector General who reports directly to the Chief. The deputies are:

Deputy CNO for Personnel
Deputy CNO for Administration


OVERALL OPERATING ORGANIZATION OF THE NAVAL ESTABLISHMENT
THE PRESIDENT OF THE UNITED STATES
Commander in Chief, Armed Forces
Policy control
Command, naval and logistics
Administration, business and logistics
Principal naval advisor
Principal naval advisor and executive
JOINT CHIEFS OF STAFF
Establish strategy and issue directives covering operations
THE SECRETARY OF THE NAVY
General supervision of all naval affairs
NAVAL COMMAND ASSISTANTS
CHIEF OF NAVAL OPERATIONS
• Command of the operating forces
• Naval administration of the naval establishment
• Plan and supervise the logistic support of operating forces
CIVILIAN EXECUTIVE ASSISTANTS
UNDER AND ASSISTANT SECRETARIES
• Coordinate procurement, production, research and development activities
• Supervise budgeting and expenditure of funds, utilization of personnel and facilities, improvement in organization, staffing procedures
NAVAL TECHNICAL ASSISTANTS
CHIEFS OF BUREAUS
COMMANDANT MARINE CORPS
Immediate supervision of bureaus and shore activities engaged in development, procurement, production and distribution.
Contracts with national industry
Via district and base commandants
OPERATING FORCES
Fleets
Tactical Operations
Sea Frontiers
Frontier Defense
Collaboration
THE SHORE ESTABLISHMENT
Field activities of the Navy department engaged in supplying and maintaining the operating forces.

Deputy CNO for Operations
Deputy CNO for Logistics
Deputy CNO for Air
Deputy CNO for Special Weapons.

In case of absence of the Chief of Naval Operations, the Vice Chief succeeds to command, followed by the Deputies in the order of their precedence.

The Chiefs of Bureaus of the Navy Department, the Commandant of the Marine Corps, and the Judge Advocate General are the naval technical assistants. In wartime, the Commandant of the Coast Guard is added to this list. In broad outline, their functions are as follows:

(a) *Headquarters, U.S. Marine Corps* —as the name implies, procures, trains, equips, distributes and administers the personnel of the Marine Corps, both officer and enlisted. It also operates the Marine Corps shore establishments and installations. It does not operate the Fleet Marine Force which is an integral part of the fleet.

(b) *Bureau of Aeronautics*—designs, procures, issues and maintains aircraft and aviation equipment; outfits originally, and thereafter maintains, aviation bases and shore establishments.

(c) *Bureau of Ordnance*—designs, procures, issues and maintains all arms and armament including fire control apparata; operates all ordnance field activities such as plants, factories, depots and proving grounds.

(d) *Bureau of Ships*—designs, builds or procures, and maintains ships and small craft; has cognizance of all machinery, electrical, radio, sound and other similar equipment; operates and maintains Naval Shipyards and resident inspectorates at private yards under government contract.

(e) *Bureau of Yards and Docks*—designs, builds and maintains all public works and utilities including those at advanced bases; trains, distributes and maintains the Construction Battalions (Seabees).

(f) *Bureau of Supplies and Accounts* —procures, stores and issues all general supplies except those technical items under specific cognizance of another bureau; maintains the property account of the Navy and performs all finance functions for the naval establishment.

(g) *Bureau of Naval Personnel*—recruits, trains and distributes naval personnel, both officer and enlisted; handles welfare, discipline and promotion; operates personnel centers.

(h) *Bureau of Medicine and Surgery* —is responsible for the health, sanitation and hospitalization of the Navy; procures and distributes medical supplies; operates hospitals, clinics and dispensaries; trains medical personnel.

(i) *Judge Advocate General*—is the legal officer of the Navy Department. He handles all matters of naval and civil law. He reports to the Assistant Secretary of the Navy on taxation questions, settlement of claims, and legislation concerning other than personnel matters. He reports to the Assistant Secretary of the Navy for Air on all personnel matters.

(j) *The U.S. Coast Guard*—in wartime, becomes an integral part of the Navy, with a position in the organization and a scope of autonomy closely similar to those of the U.S. Marine Corps. It is concerned primarily with maritime law enforcement, policing the seas, disaster service, and the operation of Sea-Air rescue facilities. Like the Marine Corps, the Coast Guard operates its own shore installations and establishment.

The Bureaus and offices listed above exercise technical direction of the field installations of the Shore Establishment. They control, supervise and assign the work distribution to the Shore Establishment, to the end that the Operating Forces shall receive efficient material support.

Supply of Amphibious Forces

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ONE of the least known but most important logistical advancements of World War II was a technique developed in connection with the supply of amphibious forces, during the New Guinea Campaign.

The New Guinea Campaign proved invaluable in developing techniques for amphibious operations and employing the by-passing method. Each of these operations were, however, minor operations, employing forces in varying sizes from a battalion combat team to a division combat team. The rapidity with which these operations were carried out, however, taxed the capabilities of the supporting rear bases. It was found that, usually, the nearest supporting logistical installation could offer little or no support as time did not permit development of that base to be of any material value. In this respect it must be borne in mind that bases in New Guinea had to be developed in jungle country, completely devoid of such facilities as roads, piers, buildings and the like, and under the worst possible terrain and climatic conditions.

As a result, support of task forces was usually furnished by the more developed and distant bases. The net result proved these tactics correct in this series of operations, but it was also realized that a large scale operation employing a corps or army could not be supported by these methods. During the later stages of the New Guinea Campaign, beginning with the Hollandia operation, a new experiment was, therefore, tried and developed.

Theoretically, this method envisioned supporting a task force directly from the United States by estimating foreseeable requirements and developing a stowage plan which would permit rapid selective discharge of the cargo. These tailor-loaded ships veritably transformed each cargo vessel into a floating warehouse. These floating warehouses, which later became familiarly known as "block ships," remained offshore and cargo was unloaded as requirements were presented.

This plan of effecting supply of an operation directly from the United States was a major departure from conventional supply procedures when considered in its scope and magnitude. Normally supplies are fed to a theater of operations by means of large bulk shipments, through the communications zone, into the theater depot system. In the depots nearest the ports, supplies are segregated and forwarded to advance depots. From the advance depots, supplies are forwarded to fill the requisitions of tactical units. The use of "block ships" in effect, put the zone of interior in the retail supply business and eliminated certain ports and depots.

The original concept of a "block ship" was to provide on each vessel a balanced quantity of all essential items. After careful study, however, it was determined that the quantity of ammunition re-

quired in the early phase of an operation was so much greater than that required in the following phases that it was not practicable to load the same quantities of Class V supplies on "block ships" required during the early phases as on ships required in later phases. Consequently for the sake of uniformity, it was decided to eliminate Class V supplies from "block ships." Also, due to the fact that motor and Diesel fuel could, within a matter of days after the assault phase, be supplied to bulk installations, Class III supplies on "block ships" were limited to balanced quantities of oils, greases, kerosene and range fuel and only a token quantity of those items which were to be supplied through bulk facilities. As a result the first "block ships" used to any extent each contained thirty days of supply for 20,000 troops of Class I, II, III (less motor and Diesel fuel), and IV of all the technical services, and 1850 drums each of motor and Diesel fuel. Ammunition was loaded on separate vessels containing only Class V.

The first loading of "block ships" was given the code name of "PLUM," and while it was infinitely more satisfactory than the old method, there was still left something to be desired. First, the items and quantities selected for supply on "block ships" were not entirely satisfactory. Second, the stowage plan was not all that could be expected, for in numerous instances, low priority cargo was top-loaded on the vessels and had to be unloaded in order to obtain supplies critically needed. These two defects were not serious, and were almost completely eliminated as additional experience was gained. The third fault was more serious and resulted in a change in the original concept. It was soon discoverd that almost without exception an urgent unforeseeable demand for a particular class or

Engine oil piled on a dock in India. (Signal Corps photo.)

type of supply would arise. Consequently, it would be necessary to unload partially several ships to secure the necessary quantities of the required items, as the limited facilities would not permit the vessels to be unloaded completely. Numerous ships only partially unloaded were forced to remain in the target area for extended periods with a resultant waste of critically needed shipping.

It was considered that with experience, the nature of the items, quantities to be supplied and the manner of stowage of the vessels would improve, and that these ships would be ideal to effect initial stockage of dumps and depots in the objective area. After initial stockage had been laid down, larger quantities in less variety could be furnished on each ship. The decision was, therefore, made to provide the first thirty days of supply through the use of "block ships" containing Classes I, II, III and IV supplies of all services. These ships were thereafter referred to as "standard block ships." This thirty days of supply was to be followed by supplies furnished in what became known as "solid block ships" of the following types:

Type B: Solid load of quartermaster Class I supplies (B rations, emergency rations and PX supplies).

Type C: Solid load of Class III supplies. Contained balanced quantities of all items. To be employed only during the early phases, until bulk petroleum installations could be put in operation.

Type D: Solid load of Class III supplies not stored in bulk installations. This ship to be employed after bulk petroleum installations had been placed in operation.

Type E: Solid load of Classes II and IV quartermaster, signal, medical, chemical warfare, information and education and Red Cross supplies.

Type F: Solid load of ammunition (units of fire) for all weapons of the force.

Type G: Solid load of ammunition (days of expenditure based on the task force weapons list and type of action to be expected) for the weapons of combat elements only.

Signal and Engineer: In addition to the above, specific types of signal and engineer supplies and materials were specially loaded to meet specific requirements for both services.

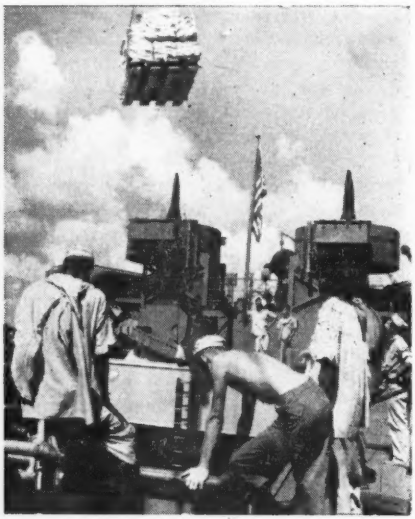
The manner in which supplies were loaded aboard "block ships" improved rapidly with each experiment. With these improvements it became possible to attain not only greater efficiency in selective discharges but to place additional supplies on each ship. Each "standard block ship" set up near the end of the war contained thirty days' supply for 25,000 troops. Any class of supply or item could be unloaded without disturbing the balance of the load. For example, rations could be unloaded without touching any other items, or for that matter the "bully-beef" could be unloaded without disturbing any other items of subsistence.

As additional experience was gained, the lists and quantities of supplies to be loaded on "block ships" became more accurate and useful.

These lists were used by the theater to indicate specifically what was to be aboard each of the ships and were referred to as "blocks." A "block" was actually a "consist" composed of a list of requisitions. These blocks were of all sizes from a small package weighing perhaps a ton, to a half shipload. For example, one block might consist of nothing but beer, while another block might consist of 40,000 different types of ordnance spare parts.

Eventually there were thirteen types of "block ships" and 125 different types of blocks. By distributing these 125 types of blocks through the thirteen types of "block ships" it can readily be seen that almost any type of loading for a specific ship could be accomplished.

While the war with Japan came to an end before the use of the latest types of "standard" and "solid" block ships, as outlined above, could be fully tested in an opposed operation, such ships were used with success in supplying the forces which occupied Japan. This experience indicates that such a system was not only superior to the normal supply system but that it had been perfected to the point where any changes would have been of a minor nature.



Unloading medical supplies. (Signal Corps photo.)

The idea has been advanced that "block ships" are wasteful, due to the fact that they are loaded to permit rapid selective discharge and therefore cannot be fully loaded. Experience in the Pacific, however, proved that such was not the case. A lightly loaded ship which could be completely and rapidly unloaded resulted in a saving of shipping during the early stages of an operation. In addition to a saving in shipping this method of resupply avoided the necessity of rehandling many thousands of tons of supplies in the theater, assured new equipment and supplies to the combat troops, took the burden of loading hundreds of ships under adverse conditions and placed this task on United States ports and depots operating with expert personnel and the finest of equipment and facilities. All concerned, from the task force commander to the officer in charge of a warehouse or on duty at a dock, could readily ascertain what was on each vessel and exactly where it was loaded. This latter advantage is one which, notwithstanding repeated efforts, was not attained throughout the war by any other method of supply, and is of the utmost importance if efficient logistical support is to be provided.

Although the technique of supply by "block ships" was developed to provide initial support to major amphibious forces, this method could be employed to good advantage in other similar operations. For example, "block ships" could be utilized to stock army or division supply points located on small islands or in areas near ports where it is not feasible or desirable for the communications zone to establish a logistical base.

Supply by "block ships" could readily be adapted to the supply of forces engaged in amphibious flanking attacks. This method could also be employed to effect initial supply and stockage of a newly organized theater of operations. During World War II automatic supply of all theaters was effected by the War Department until such time as the theater could be sufficiently organized to secure supplies on a requisition basis. This required from three to five months. Unless atomic energy, guided missiles or other developments change our present concept of waging war so drastically that occupation of enemy territory and outlying areas

from which to launch an attack against enemy occupied territory will not be necessary, theaters will again be hastily set up and automatic initial supply will be a necessity.

For those who went through the trying period of automatic supply in an overseas theater in the last war, no further comments are necessary. For those who did not, may it suffice to say that such supply was anything but satisfactory. When it is considered that this automatic supply was accomplished in haste, with limited personnel and facilities, and without experience or records for guidance, the result was probably better than could be expected.

It must be remembered that "block ships" have their limitations. Although they are an efficient tool when employed for initial supply, they cannot be employed for supply of a force for an indefinite period. Supply by this system for approximately five months is considered to be the maximum. Three months would be more desirable, as unforeseeable demands and losses in specific items will soon throw supplies furnished on any automatic supply basis out of balance, and shortages and overages in certain critical items will occur. Oversupply in some items and shortages in others can best be adjusted by the normal requisition method.

Unless, however, as previously mentioned, our concept of war is completely changed, supply by the "block ship" system will be among the first of our new developments to be utilized in the event of another conflict. The records of this technique should be carefully preserved as they will undoubtedly prove of great value in the event automatic initial supply to outlying bases again becomes necessary.

In war, transportation must be completely integrated to supply operations successfully. Movement must be integrated from origin to destination, no matter what forms of transports are used. The most critical link, thus, is at the ports, to transfer points from land to sea. Here there must be a control of movements into the Port in order to balance shipping availability and capacity, to insure the carrying of cargoes, the matching of equipment with troop units, and the subsequent integration of overseas supply with transportation from depots all over the land. This can be accomplished only if there is a unified organization under one head, with authority to direct action.

General Brehon Somervell

Air Force

Photo Interpretation

Lieutenant Colonel Alan M. Eldridge, *Air Corps*
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IT's not a very well-known fact, but the Germans—or at least the German High Command—predicted their defeat seven years before it actually occurred—a full year before they marched into Poland.

They didn't say it in just those words, of course, but here's a statement of Field Marshal Von Fritsch, at that time the outstanding tactician, and chief of staff, of the German High Command. The Field Marshal said, "The army with the best aerial photo reconnaissance will win the next war."

The Germans tried hard to have that army. They developed outstanding aerial cameras, they trained expert photo interpreters, developed efficient field laboratories and processing facilities, and in the JU-88 they had a reconnaissance aircraft far ahead of anything we, the British or the French were using at that time.

The brilliance of the German tactics and their almost unbelievable knowledge of Allied plans and dispositions were in no small measure the result of an excellent reconnaissance organization.

But they failed to keep pace. Somewhere along the line their techniques were overshadowed by Allied developments—principally British. The United States Army Air Forces patterned our techniques on British experience and carried on from there. At the end of the war our photographic reconnaissance was second to none.

Photo interpretation may be defined as the process of determining the identity and physical characteristics of features of terrain, works of man, and the nature and extent of ground, sea or air activity from aerial photographs of an area. From a military standpoint, this includes information on terrain, and the capabilities, installations, strength, dispositions and activities of the enemy.

Stripped of its military formality, that definition simply means that qualified interpreters can see and identify exactly what's going on at the airfield, port, factory or front line position shown in the picture. Surveys made in territory now occupied have shown the amazing accuracy of reports originally made solely from aerial photographs.

Detailed photo interpretation is accomplished by the study of overlapping photographs, known as "stereo pairs," through a stereoscope. Reconnaissance photographs are taken with sixty per cent overlap so that any one point on a picture is also on the preceding or following print. The stereoscope is set so that one lens is over the same point on each of the pictures. Since each picture was taken from a different point in the air, one sees it from two different angles and gets stereo vision. With this three-dimensional vision it is possible to see and study details not apparent in a single photograph.

Photo interpreters study these pictures

in detail, reporting on all installations and activity seen, and there is very little that can be hidden, for trained interpreters report not only what they see in detail—but also what they can tell from "indications" and "associated features." For example, they might not be able to see a supply dump—but because of the "associated features" of tracks or trails leading into a wood; the type of trucks occasionally seen on those trails, and by elimination of other possible areas in the immediate vicinity—they would still be able to point unerringly to the dump location.

Similarly, a concentration of antiaircraft artillery guns frequently are located the same way, by "associated features," without the guns themselves ever being seen on the photographs. By finding the emplacements, by tracing the trails between the guns and the fire director, by finding the ammunition dump the photo interpreter can plot the location of the battery accurately.

At one time during the early days of the Anzio beachhead, a powerful German battery that was dealing misery to our beachhead forces from the hills was found and destroyed without the guns ever having been seen. The location was determined within an area of three to four square miles by sound-and-flash methods. Photographs of that area over a 3-day period were studied, and the photo interpreter noticed that a small clearing in the woods changed shape during that period. Heavy counterbattery concentrations were laid on the area immediately and the enemy guns were knocked out—without our ever having seen them.

Another example of associated deduction occurs in all bomb damage assessment interpretation. Bombs dropped through a factory building may show only a hole in the roof on the reconnaissance photographs—but by knowing the size and type of bomb used in the mission, the interpreter can make a mighty accurate assessment of the damage done within that building without ever actually seeing it.

The most significant tool in the hands of the photo interpreter is "repetitive" photography, because the majority of photo intelligence is obtained by a comparative study of pictures taken of the same objective at regular intervals. The first look at an airdrome, a factory, a harbor or a defense position may not mean too much—but as the interpreter studies pictures of the same point—taken at daily, weekly or even monthly intervals—and notes the changes and developments—he can begin to put together exactly what is going on below.

Major airdromes generally are photographed every day that weather permits, and comparative studies of the number and type of aircraft, dispersal areas, build-up of supply dumps, location of new bivouac areas and all other activities give an excellent indication of the importance of that airdrome to the enemy's future plan of operations. Possible defense areas are photographed every week, or twice a week, and all new work or changes spotted by comparison with the previous sortie.

This comparative photographic study at regular intervals, daily, weekly, or monthly according to the type installations, is the very lifeblood of aerial photo-intelligence.

Photo interpretation is a highly skilled field. Out of 100 applicants, before training, very few good interpreters were obtained. (And the only ones you want are good ones; the interpreter you cannot depend on is a menace. You are better off without him.) It is a skill that takes a lot of time and experience to acquire. Men selected on the basis of past experience were given eight to twelve weeks training in well-organized schools; when they went overseas they were given another two months schooling in the theater, then they were assigned as apprentice interpreters for three to six months or more before their reports could be trusted. And even

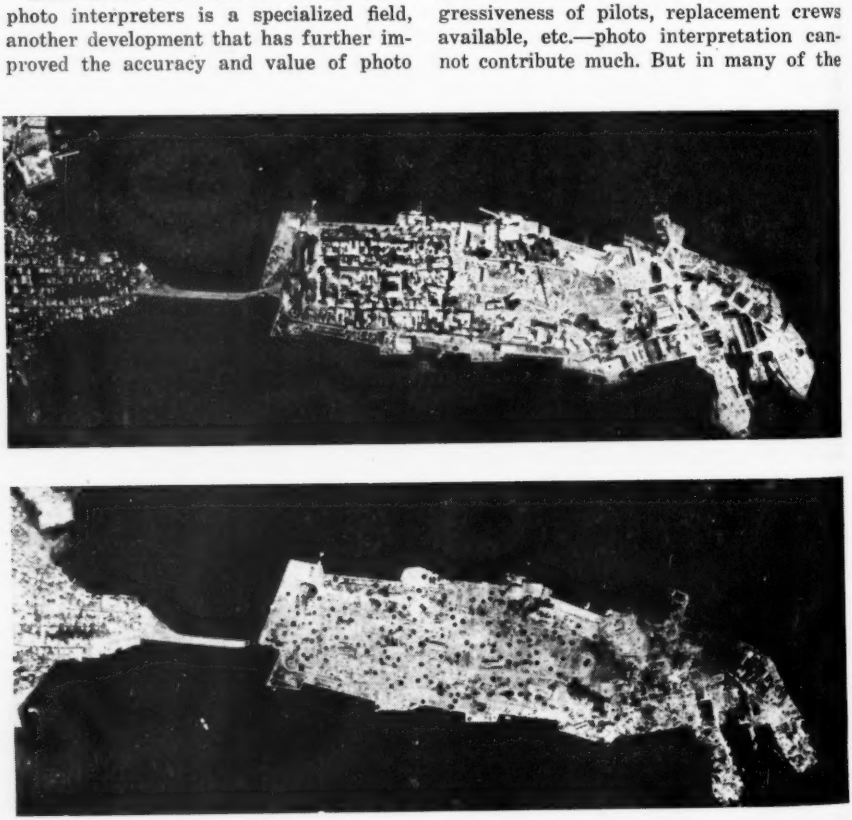
with all this training of selected men—about fifty per cent of the men received in the Mediterranean Theater were rejected.

So do not assume that anyone can be an interpreter. It is a highly skilled, infinitely painstaking science. Fortunately we had at the end of the war (as a result of the past four years of training and operations) a sizeable body of skilled, conscientious officers, and the interpreters overseas were proved and dependable.

Each of the classifications of air force photo interpreters is a specialized field, another development that has further improved the accuracy and value of photo interpretation. When skilled men specialize on airdromes, or flak, or bomb damage assessment, and spend all their time thinking and working in that particular field—they naturally increase their skill, and their dependability.

There are eight major fields of specialization for photo-interpreters who produce air intelligence.

1. *Air Order of Battle.* Air order of battle involves many factors. In such factors as morale and state of training, aggressiveness of pilots, replacement crews available, etc.—photo interpretation cannot contribute much. But in many of the



The Japanese had a base at Cavite. Note bomb craters. (U.S. AAF photos.)

most important factors, photo interpretation is the primary source.

All airdromes are photographed every day that weather permits to determine the type and number of aircraft thereon, to keep information on the status of supplies current, and to discover any changes, alterations or new construction. Inactive fields are studied so frequently that they cannot be occupied without our picking up advance indications of occupation. Areas suitable for airdromes, from a terrain standpoint, are searched regularly. Factories are located from exploratory work and by following leads from other sources, then kept under photographic surveillance and accurate estimates made on production rates. This photo coverage, flowing through the interpretation section constantly, enables photo interpreters to keep accurately up-to-date on type and number of aircraft, their locations and movements, production rates and development of new airdromes.

Reports go out daily as photo reconaissance planes return to the home airbase. These daily reports tell the number and type of aircraft on the field, their location in dispersal areas, how many seem operational, any new arrivals, and construction work going on at the field, whether supply dumps are increasing or decreasing, and any other information obtainable from a close and detailed comparative study of that day-to-day photography.

Reports are disseminated automatically to everyone requiring the information, so that all interested headquarters are kept up to date on the enemy's activity.

2. *Target Information.* This is one of the biggest fields for the air photo interpreter; and is also one of the most difficult and specialized. Exploratory photo work picks up evidence of new factories which thereafter are covered regularly. Routine coverage of known factories and industrial areas provides basic material. Photo planes also follow up leads from other sources, and confirm or deny these reports. Highly skilled interpreters then are able to identify the plants, the equipment they are manufacturing, and from continued repetitive coverage keep abreast of developments and estimate production. Vulnerability studies of those factories are made, pointing out the best points of attack to stop production.

Target charts are prepared and annotated, and briefing and recognition material of various types is prepared and provided to assist the bomber crews to locate their targets accurately.

3. *Bomb Damage Assessment,* of all the types of reports prepared by photo-interpreters, is easily the most eagerly awaited by all echelons and sections of an air force. After a bombing mission has been flown, the first question is "did we hit it . . . and how hard?"

Pictures taken by the bombers themselves give the first answer, at least as to whether the correct target was hit, but a detailed assessment of damage can be made only from large-scale photographs taken after the smoke of the bombing and the resulting fires has been dissipated.

Damage assessment interpreters, using the post-attack photographs, make a detailed comparison with photographs made prior to the raid, and by this comparison are able to make an extremely accurate report as to the damage done on this particular raid, the amount of production stopped, the percentage of destruction, and the length of time it will take to put the target back into operation.

4. *Industrial Activity Studies* are going on constantly, both in connection with bombed targets and with various key industries. Through the constant photographic check-ups on bombed targets it is possible for the trained interpreter to keep pace with repair activity going forward, to estimate construction and production progress, and to determine dates when the target should be re-attacked. It is good

business to let the enemy spend the maximum in manpower and material in rebuilding the target, then just before it is ready to go into production go out and knock it off again.

Similarly, constant check is kept on all key industries; aircraft production, shipbuilding, tank, truck, and heavy gun manufacture, etc. Through this continuous study, checked by traffic studies, it is possible to arrive at accurate estimates of enemy production.

Marshalling yards at Crailsheim, Germany—the target. (U.S. AAF photo.)

5. *Flak Studies.* Every major target, principal cities, coastline cross-over points, IP's, and routes to and from targets, are photographed frequently enough to keep thoroughly informed on the number and type of guns installed at those points.

Specialized flak interpreters are able to set up flak maps showing with amazing accuracy the pinpoint location of guns, their type and in many cases their caliber, the fire control systems, the ammunition dumps and all other details. From these studies, flak officers plot effective ranges of the guns, delineate the best approaches for our aircraft, locate those areas where the enemy can place heaviest fire concentrations, and recommend the best evasive tactics for our aircraft.

6. *Bomb Fall Plots* are made from photographs taken by bombers during the attack, compared with after-attack photographs taken by reconnaissance planes. Skilled interpreters, knowing the formations and bombing techniques used by the attacking bombers, can trace the build-up of bombs on the target, and actually determine the bombfall patterns made by the various formations taking part in the attack. As one can well imagine, this becomes a difficult job with a repeatedly bombed target, and requires the most detailed comparative work on the part of the interpreter. These studies are used for critique and they are of most importance to A-3.

7. *Transportation and Communication Studies* are made by another group of specialized interpreters, and are of value in several ways. First, constant study of main rail and road nets, and freight marshalling yards and spurs, enables the interpreter to keep a continuous record of the amount and type of shipping and of the flow of enemy supplies.

Then detailed studies of the transportation systems themselves establish the location of all the vulnerable points along the way. This information is of great help in the "isolation of the battlefield" stage of air action, because these studies show all bridges, defiles and choke points, the construction of bridges, and the type and weight of bomb load it will take to knock them out.

Similarly, studies provide engineers with advance information on repair requirements once the territory is in our hands, and gives A-4 and the transportation experts an accurate idea of the capabilities of the system from our own operational standpoint.

8. *Radar Studies:* Photo interpreters who are expert in enemy radar employment are constantly searching all photography for radar installations. Also they follow up reports from air formations and ferret planes, and are continually requesting search missions covering likely looking sites. From photographs of the radar installations, their locations and the surrounding terrain, they are able to plot amazingly accurate estimates of the range and coverage of the warning net. This search for radar, both from a flying and an interpretation standpoint, is a continuous operation, and specialized interpreters devote their full time to it.

Some tricky flying is frequently necessary in order to provide pictures that can be accurately interpreted. Many times, because of the type or siting of the enemy radar, low-level "dicing" sorties must be flown, or pictures taken from medium alti-

Yards at Crailsheim—damage assessment. (U.S. AAF photo.)

tudes at certain hours of the morning or evening to cast the right shadows for interpretation. The field is highly specialized and requires not only a top-notch photo interpreter, but a man with considerable radar knowledge as well.

These photo interpreters prepare and present their information in two main classes of reports:

1. *Immediate Reports* (formerly called "first phase") are made immediately after the film has been processed—under some conditions even from the negative, or from wet photographs—in order to get vital information out as rapidly as possible. Immediate reports are disseminated at highest priority, and generally concern order of battle information, initial bomb damage reports, transitory targets, communications or other information of high immediate operational importance.

2. The second broad classification is *Detailed Reports.* As the name implies, these are longer and more detailed in nature. Generally, they are based on a comparative study of photography repeated over a period of time.

Sometimes, Detailed Reports are merely an elaboration of the first immediate report; sometimes they go out periodically to cover specific activities, industries such as aircraft manufacture, airfields or daily flak report. At other times they are special reports issued on request or to bring up-to-date information on certain enemy industries or activities on which a continuous series of reports have been issued.

The important thing about photo interpretation reports is that they are disseminated as widely as possible under the existing security policy and they are disseminated directly to the using agencies. Every effort is made to cut down the time lag between the request for and the delivery of needed information.

Also, every effort is made to make the reports as automatic as possible, that is, to keep them flowing to interested headquarters so frequently that the information of everyone concerned is constantly the same, and constantly up to date. For example, immediate reports on number and type of aircraft on enemy fields go out as rapidly as the film is processed, and to all echelons from Air Force down to Wing. Thus, day after day, every planning echelon has the latest available information on the location and strength of the enemy air opposition.

The Army Air Forces, through wide experience during the past four years, has arrived at an extremely efficient organization of photo interpreters to meet all situations.

The T/O of a photo reconnaissance squadron provides for six photo interpreters to prepare immediate reports on photos taken by the squadron when it is detached from the parent group. These interpreters are non-specialized, because they must work on a wide variety of subjects. They are adequate to take care of the interpretation of the ten to twelve sorties a squadron can fly each day. They normally do only the immediate reports; detailed reports are prepared by interpreters either at Air Force Headquarters or at the Reconnaissance Group Headquarters.

In addition to these squadron interpreters, the Air Force has an additional Photo Interpretation organization—the Photo Technical Squadron, which is composed of photo processing and photo interpretation personnel and equipment.

The revised T/O&E 1-778, dated 31 May 1945, for Photo Tech Squadron provides for a photo interpretation section composed of twenty-nine officers and thirty-six enlisted men with augmentation as required of twenty additional photo interpretation officers and four additional enlisted men. This Photo Tech Squadron provides for all the associated services including quantity reproduction, compilation

of target charts and mosaics with complete servicing facilities.

Photo interpreters work in the closest cooperation and coordination with all headquarters using photo intelligence. They are highly classified from a security standpoint and are given advance information on plans and activities so that they can keep ahead of operations and have information available when needed. Also, this advance information frequently is of value to them in extracting additional vital information from their routine interpretation.

Generally, the bulk of the work is in accordance with SOP's as to targets to be covered from a flying standpoint, the type of reports to be submitted and method of dissemination. By working the whole operation down to a scheduled and planned "routine"—it is possible to keep a constant and up-to-date fund of accurate information in the hands of all concerned. The majority of information needed on enemy airdromes and order of battle, targets, flak, shipping and transportation and bomb damage is handled through this "routine" flying and interpretation system.

Photo interpretation is a major tool of both the Intelligence and Operations section, but its usefulness is not confined to those staff sections alone. All sections have used aerial photographs and photo interpretation reports to advantage at various times. Once the A-4 sees how he can figure out his supply routes, his dump areas, and estimate his building requirements from photo interpretation reports, he will think up a dozen other effective ways he can use it.

The Engineer is one of the biggest customers, both in the Ground Forces and the Air Forces, because one of his major problems is getting the material he will need forward, and estimating re-building time. If we can provide that information for him in advance we are certainly simplifying his problems.

Examples of uses too numerous to mention to which all staff sections put photo interpretation reports occurred repeatedly during the war. This article barely scratches the surface of the accomplished facts. The high-flying, lonesome photo-ship and the studious photo interpreter are a team that supplied some ninety per cent of the information used in winning the air phase of World War II.

Military history clearly demonstrates that when military personnel depart from the highest standards of conduct, the force which they comprise experiences a corresponding decline in strength because of the resultant weakening of discipline and the general undermining of authority. Discipline must flow from within and must be controlled from without.

General Carl Spaatz

The

Army Service Command

Lieutenant Colonel Robert W. May, *Quartermaster Corps*
Instructor, Command and Staff College

Introduction

THE type of island hopping operations that were necessary in the Pacific with the small land areas were not adaptable to organizing the theater into the typical organization of a Combat Zone, with its Army Service Area and Communications Zone as was found in the European Theater.

The early amphibious operations, which were supported as best they could be, developed the need for an organizational change that would (1) relieve the tactical troops of all logistical responsibility insofar as practicable, and as soon as the situation permitted; (2) facilitate support of continued operations in the local vicinity; and (3) at the same time initiate development of a base to support future operations against other islands.

Since a field army does not have the organization, equipment or training to build a large logistical base the "Army Service Command" was developed to meet this need. Thus, a new title, "ASCOM,"* as the organization was more commonly known in the Southwest Pacific, was injected into Army terminology.

The purpose here is to attempt to explain in general the mission, organization, and functions of ASCOM as it was found in the SWPA.

Mission

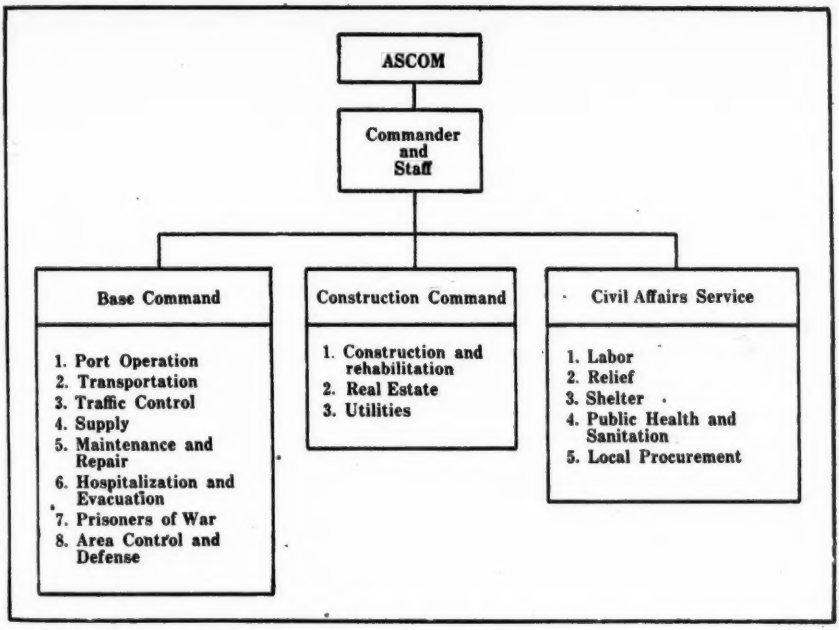
The primary mission of ASCOM is to provide complete logistical support for the tactical troops at the earliest practicable date and, consistent with the situation, concurrently develop a communications zone base to support continued or future operations.

Organization

A new ASCOM was formed for each major amphibious operation where immediate base development was necessary to implement subsequent operations. It consisted primarily, of personnel and units from the United States Army Services of Supply (later redesignated Army Forces Western Pacific, and which, for convenience, will be referred to hereafter as the Communications Zone), plus such service elements provided by the tactical force which were not required for close support of the combat units. The headquarters was organized and key personnel transferred thereto by Com Zone as soon as practicable, normally three to six months in advance of the projected operation.

There was no prescribed organization for ASCOM, as each one was set up to meet the requirements of the particular operation it was to support. However, the headquarters usually conformed to a general staff type organization with as many subordinate staff sections as necessary to perform its mission. The chart on page 53, illustrates the basic organization usually followed.

* Comparable organization in the Middle Pacific was known by the short name "ISCOM."



NOTE: Members of the staff frequently held a dual status as staff officers and commanders of operating agencies.

Originally, ASCOM's were numerically designated to conform with the army they were supporting, for example, "Sixth Army Service Command." However, in the later days of the war they were given letter designations from the code name of the operation to be supported, such as, "ASCOM 'C'" for Coronet Operation.

Functions

The functions of ASCOM are divided into two phases: planning and operations.

Planning Phase.—The initial logistical planning for each amphibious operation was a continuous process carried out by the Planning Section of Com Zone Headquarters, and when a new ASCOM was formed, part of the personnel of that section would be assigned to ASCOM to carry on the detailed planning of logistical support and base development for the particular operation it was to support. Close cooperation was maintained with Com Zone, Army, Air Force and other headquarters that were to take part in the operation, to insure that the development of these plans was coordinated with the tactical requirements and procedures.

During this phase ASCOM:

1. Computed the service troops and supply requirements, and planned the construction of installations and facilities to meet the phased requirements of the operation.

2. Set up procedures and methods of supply operations in the objective area.

3. Insured that the estimates did not

include requests for troops or supplies for unnecessary or duplicating activities.

Throughout the planning phase ASCOM remained under the control of Com Zone and actual operations were limited to setting up the organization and putting the plans into motion.

Operations Phase.—Not later than D-30 ASCOM was transferred to and placed under the direct command of the Army or Task Force Commander who had been given the responsibility of conducting the operation. At this time the logistical and tactical plans were completely integrated, specific assignment of logistical functions completed, and an allocation of shipping made by the Task Force Commander.

The ASCOM Commander was responsible that the troops, supplies, and equipment under his control were loaded on the assigned shipping in the priority required to carry out his mission.

In amphibious operations the initial responsibility for close logistic support of combat troops rested with the shore party elements of the assault units up to and including corps. As each echelon advanced farther inland in the exploitation of initial successes, the control of shore functions passed to the next higher echelon as soon as it was established ashore.

As the tactical elements of the force successively secured projected phase lines and occupied more and more land areas ASCOM moved in, when directed by the Task Force Commander, and took over complete logistic responsibility for the entire force and control of all area in rear of corps boundaries. This responsibility was delegated to ASCOM as soon as the situation ashore permitted, normally between D+5 and D+10. By progressive expansion at the heels of the combat troops, the area of responsibility was increased until the Army rear boundary was established or until it encompassed the entire island. At this time the Task Force Commander was relieved of any further base responsibilities. ASCOM passed out of the picture and was reorganized into a communications zone base. Normally this occurred by D+50.

The Shore Party manhandles supplies in the initial stages of landing. (Signal Corps photo.)

Purple Beach, Iwo Jima. (Signal Corps photo.)

Although the specific duties performed by ASCOM in accomplishing its assigned tasks, and the priority in which each project was undertaken were designated by the Task Force Commander in each instance, the following functions have been selected as those usually assigned to ASCOM:

1. All construction and rehabilitation within the service area, including airfields, bulk petroleum facilities, docks, roads, railroads, storage facilities, hospitals and housing.

2. Operation and maintenance of port facilities, including the discharge of troop and cargo ships.

3. Operation and maintenance of all supply point facilities within the service area, including the receipt, storage and issue of all supplies, equipment and materials arriving in the objective area.

4. Maintenance and operation of service installations and communications in the service area.

5. Hospitalization and evacuation.

6. Administration of civil affairs, including procurement, housing and supervision of civilian labor, public health and sanitation, relief and local procurement of supplies, equipment materials and facilities.

7. Receipt, processing and disposition of prisoners of war.

8. Base development, in accordance with directives from higher headquarters. Base development in excess of minimum operable facilities for initial port operation and handling of supplies to support tactical operations was undertaken in lower priority than any of the functions stated above.

Conclusion

The objective area in amphibious operations is, in effect, a sub-theater of operations with the Task Force Commander in command of all combat and service forces.

In carrying out its mission ASCOM performed the normal functions of both army service troops and an advance section, communication zone. Since it is established on an equal command level with the major tactical units of the force it may be described better as a "Logistical Corps" or if two or more field armies are involved in the operation it may increase in size to the equivalent of a "Logistical Army." Regardless of the title you might give it, the principal point to remember is that the sole reason for the creation of an ASCOM was to provide an organization which would relieve the combat forces of the burden of detailed logistical planning and operations necessary to support the force and implement the required base development.

The Landing Force Commander must decide between thoroughly testing his shore organization by full unloading, and keeping his equipment and stores ready-loaded for the operation to avoid damage or deterioration. Provided time is available, the value of the rehearsal is greatly enhanced by fully unloading the early echelons, and the risk to equipment should not be serious.

From an official report.

It will never be possible to achieve absolute coordination of the supply and service functions of all services. Neither the War Department nor the Navy Department has been able to eliminate all duplication even within its own organization. But there is no question that the extent of waste through the lack of coordination between the two departments is very much greater than the waste resulting from faulty coordination within each. If we can attain as much coordination among all the services as now exists within each department, we shall realize extensive savings.

President Harry S. Truman

Staff Responsibility for Troops

Colonel Raymond O. Ford, *General Staff Corps*
Formerly with G-4 Section, Twelfth Army Group

IN the majority of military operations one of the controlling factors considered by a commander before undertaking an operation, and one which seriously affects the outcome, is manpower. The manpower available to a field commander is organized into various types of military units. After he receives his units, the management of them is a very important part of his staff operation.

Military units are usually divided into two general categories—combat and service. Combat units are those whose primary mission is the destruction of enemy forces or installations, and in general, are those belonging to the "arms." Paragraph 25 of FM 100-5, "Field Service Regulations—Operations," designates the "arms" as consisting of the Infantry, the Cavalry, the Field Artillery, the Coast Artillery Corps, the Corps of Engineers, and the Signal Corps. Service units belong to the "services" which are charged with serving the arms by performing the necessary functions of administration. The Chemical Warfare Service has certain combat units of chemical troops.

The following is a quotation of Paragraph 26 of FM 100-5.

"No one arm wins battles. The combined action of all arms and services is essential to success. The characteristics of each arm and service adapt it to the performance of its special function. The higher commander coordinates and directs the action of all, exploiting their powers to attain the ends sought."

The organization of a commander's staff to effect this coordination is of great importance. Unfortunately, FM 101-5, "Staff Officers' Field Manual—The Staff and Combat Orders," does not clearly define the responsibilities of the various General Staff sections with regard to troops.

The Operations and Training Section, G-3, has major responsibility for troops. In Paragraph 16 of FM 101-5, it is charged with:

"b. (1) (a) Mobilization of the command.
(b) Organization and equipment of units.
* * * * * * *
(3) (c) 2 Troop Movements
3 Tactical employment of units (coordination with G-4 for influence of supply and evacuation in operations; G-2 for capabilities of enemy; G-1 on morale of troops)."

The Supply and Evacuation Section, G-4, is charged in Paragraph 17 of FM 101-5 with:

"b. (10) Assignment and movement of supply, medical, technical, and labor troops not employed as combat troops. (Coordination with G-3 to avoid conflict with tactical movements.)"

The Personnel Section, G-1, and the Military Intelligence Section, G-2, have

primary interest in units such as military police, finance, postal, and intelligence agencies, because these units carry out responsibilities charged to those sections.

These are the various units of the arms and services, some of major interest to one general staff section and some to another. These units must be coordinated into one team to exploit their powers successfully. The problem of the control of troops can be roughly divided into the following phases:

1. *Establishment of a Troop Basis.*—The determination of the number and types of various units required to carry out a mission.

2. *The Build-Up.*—The movement of the units on a Troop Basis into a zone of operations so as to present a balanced force.

3. *Allocation of troops during operations.*—The movement of units between subordinate commands as required by changes in the tactical situation.

4. *Redeployment of troops.*—Movement of troops out of a zone of operations upon accomplishment of mission.

To assign the responsibility for troop control to the general staff section having major interest in that type of unit means a divided control which is not adapted to some of the phases listed above. All except the allocation of troops during operations must be handled under a unified control.

The largest field command which has ever existed in the United States Army was the Twelfth Army Group during the European Campaign. Here, under one command were four armies with twelve corps and forty-six divisions. The responsibility for troop control was divided between G-3 and G-4 on the Army Group Staff. G-4 was responsible for all medical, ordnance and transportation corps units; chemical decontamination, depot and maintenance companies; engineer depot, dump truck, maintenance and water supply companies and utilities detachments; and signal depot and repair companies. All other troops were a responsibility of G-3. These two general staff sections were the only agencies authorized to request the Adjutant General to issue a troop assignment order. Appropriate special staff sections made recommendations to G-4 and some special and other general staff sections made recommendations to G-3.

Fortunately, the Troops Branches of G-3 and G-4 worked together harmoniously throughout the whole campaign. The coordination of troop control was successfully carried out. This organization under other conditions might not have worked so well. A clearer definition of responsibilities for troops in the field manuals would be helpful.

The following is believed to be a sound and efficient staff organization for handling of troops.

1. G-3 should be completely responsible for troop control.

2. G-1 and G-4 should have representatives in the G-3 Troops Branch to insure that no action will be taken that will jeopardize any parts of the mission for which those general staff officers are responsible.

3. Recommendations should be made to G-3 by the special staff and approved by G-1 or G-4, when appropriate. G-3 would then authorize the Adjutant General to issue necessary orders.

4. A master record of all troops assigned to the command should be kept by G-3 in the Troops Branch. Such a record for a large command is complex and involves considerable effort. Duplication of this record in other sections of the headquarters is not justified.

A troop control organization similar to the above will give complete and unified coordination with minimum personnel, and yet provide the necessary safeguarding of interest for all concerned on a staff.

The Operations Section *in* Air Units

Lieutenant Colonel Travis Hoover, *Air Corps*
Instructor, Command and Staff College

IN Air Force organizations the operation section of wings and larger units is designated as the A-3 section, and as S-3 in groups and squadrons. This officer assisted by the operations section staff is primarily concerned and charged with those functions related to organization, training, operational planning, and combat operations.

The number of personnel required to staff the A-3 section is of course determined by the nature and magnitude of its commitments, the most influential factor being its level in the chain of command.

The various ways in which this section may be organized and arranged are many. However, it will usually be highly departmentalized in higher headquarters and will become less so in the lower echelons. The personnel of the A-3 section in the higher levels may be organized into various subsections, each being charged with the duty of carrying out one or more of the general functions mentioned above. These subsections may be further subdivided into additional subsections. These subsections, like air commands are always designated by the functions which they are performing; for example, the "Organization Subsection," the "Training Subsection," the "Operational Planning Subsection," and the "Combat Operations Subsection." As to a further breakdown of these divisions, as they are sometimes called, the dividing of the "Training Subsection" into an "Air Training Subsection" and a "Ground Training Subsection" will serve as an example.

In wings, groups, and squadrons all of the members of the operations section staff are familiar with, and qualified to carry out all of the various duties and functions of the section. Therefore they work as one section and are normally not organized into subsections. Of course the operations officer may organize his staff and section in the manner which he believes to be the most effective and efficient for performing the activities and carrying out the functions for which he is responsible. General functions of the operations section related to:

a. Organization.—The duties of the A-3 in relation to the general functions of organization may be stated as the supervising of the organization and equipping of assigned units. Yet no great amount of thought is necessary to see that there are many ramifications of these duties and that a great amount of coordination with other staff sections is mandatory.

In order to be qualified to make recommendations to the commanding general for the assignment of allocated personnel, equipment, and newly arrived units the A-3 first must be completely familiar with the units of his organization. In smaller Air Force organizations this familiarity with the units of the command is secured and maintained by the A-3 by personal

contact, staff visits, inspections, supervision, and direct dealings with the units and their respective commanding officers and staffs. It can be readily understood that such close personal contact is impossible down through all the echelons of command in the case of very large units. Here the problem of maintaining a complete and thorough knowledge of his lower units must be approached by the A-3 in a somewhat different manner. Usually an up to date, complete ready reference file is maintained for each of the lower units. This file contains as much information on the unit as possible which might be of use to the A-3. Such information as to the location of the unit, the name of the commander, the T/O&E under which it is organized, the type of aircraft with which equipped, the actual strength as compared to authorized strength in both personnel and aircraft, the training proficiency of the combat crews including such detailed information as the number of missions of the lead crews and the average number of missions of the entire unit, a list of all shortages in personnel and equipment, and any other pertinent data of importance or interest, will be kept in this file. Assisted by this information, the A-3 establishes priorities for the assignment of personnel and the issue of equipment.

In the theater of operations the T/O&E under which certain units of the command are organized are often found to be inadequate to carry out the operational plans of the command. It is the A-3 who initiates recommendations for the necessary changes and revisions. In making recommendations to the commander for assignment of personnel, distribution of equipment, and changes in organization the A-3 must bear in mind future operational plans and coordinate such recommendations to the utmost with other staff sections of the command.

b. Training.—The duties of the operations section relating to the general functions of training may be stated as the preparation of training programs, training directives, orders, and the supervision of their execution.

In the theater of operations, training activities become pretty much a matter of combining the knowledge, experience, and lessons learned in actual combat, into a highly concentrated finishing school. Training facilities, training aids and materials are absolute essentials to the training program, and as such must be procured and distributed by the operations section. The establishment and operation of bombing and gunnery ranges and the coordination of the schedules for their use is also a responsibility of this section.

New developments in combat tactics and technique, as well as new developments in equipment, often makes necessary the establishment of special training schools to train the command or a portion thereof to meet these new requirements. Changes in the tactical plans may also require specialized training. In addition to establishing these schools the operations section must select instructors, make recommendations for the assignment of students, and establish quotas for the units of the command. Here again close cooperation and coordination with personnel section is paramount.

To assure effectiveness of the training programs the A-3 will make frequent personal visits to the units. While making these visits he will be able to observe the progress being made in the training program as well as insure compliance with directives and orders. The suitability of training aids, facilities, and bombing and gunnery ranges may be determined. Many obstacles to the program may be eliminated. The A-3 will discuss both present and future training programs with the unit commander and also determine the combat proficiency of the organization as a whole.

c. Operational Planning.—The duties of

the operations section relating to operational planning may be stated as those general functions pertaining to the formulation of future plans by weaving and molding the policies, tactics, combat technique, and general strategy of the command into a scheme of operations known as the operational plans of the command.

While one phase or one mission of an operation is in progress, the next one must be planned. Thus operational planning can truly be considered a part of operations, however, due to its importance and the fact that in higher headquarters it is given the full attention of a separate subsection, separating it from the combat operations of the command, it may be considered as one of the general functions of the operations section. A specialist staff group is often used to assist the operational planning staff by furnishing technical data and specialized target information.

In large commands much of this planning is of a long range anticipatory nature to make preparations for effectively meeting their forthcoming commitments. These plans are disseminated to all units concerned with the least possible delay, thus facilitating their planning and permitting them to make necessary preparations. The amount of operational planning decreases proportionately in each succeeding lower echelon of command. In operational planning, coordination with other staff sections and adjacent, higher and lower organizations cannot be overdone.

d. Combat Operations.—The operations section's duties relating to combat operations may be stated as those functions pertaining to the actual dispatching of aircraft on combat missions. Again, the many allied and related functions, which must be performed before this dispatching can be accomplished, can readily be seen.

First, the A-3 must make a continuous study of the tactical situation if he is to use his forces most effectively and economically. Here the intelligence section comes in for its share of staff coordination. He must also keep well informed regarding the availability of aircraft, armament, fuel, matériel, communications equipment, and other equipment and supplies which may be used in preparation for the successful completion of any tactical operations. Coordination with A-4 and liaison with the Air Service Command is essential for this information.

The operations officer should familiarize himself with all types of equipment assigned to the command, making a study of all its capabilities and limitations, its weak spots and strong points. Only by having this thorough knowledge of the airplanes and equipment which the combat crews are using can we obtain their maximum effectiveness. Close contact should be maintained with the A-3 of higher headquarters regarding missions which the command may be required to perform in order that all assigned units may be properly trained and equipped for the tasks.

B-17s start off on a mission.
(U.S. AAF photo.)

Among other duties which the A-3 supervises is the selection of suitable sites for airdromes and recommends the assignment

of proper units to them. He also prepares reports and recommendations for the movement of the units of the command and is also responsible for airdrome defense.

The A-3 prepares and coordinates plans for and supervises the tactical operations of the command. In carrying out this function he must first consult the weather officer in order that his planning may take full advantage of the many influential factors which weather has upon air missions. He must work in close coordination with the intelligence section thus taking into consideration the enemy situation. Upon completion of the operations plans and their approval by the commanding general, the A-3 section converts these plans into field orders. The A-3 authenticates the copies of these orders and then transmits them to the units and staff officers concerned.

During the actual flying of the missions the operations section must maintain close contact with all units concerned. A running account of all possible information concerning the conduct of the mission must be kept on status boards, mission boards, and situation maps. These boards will contain such information as the units participating, the number of aircraft, time of take off, time, place, and altitude of rendezvous of the various formations, target time, time of return and such other information as may be of value to the section. The signal section will monitor the radio transmissions of the aircraft in flight and relay any information obtained to the operations section thus enabling the A-3 to keep an up-to-the-minute account of the progress of the mission. Often the actual progress of the mission is plotted on a large situation map. The need for assistance to aircraft in distress is determined and the necessary action including emergency rescue is initiated, plotted, and followed through by the operations section.

Upon completion of the mission the operations section must see that required reports are rendered by the participating units, and that they are consolidated and forwarded as directed by higher headquarters. An operations estimate of the situation must always be ready for presentation to the commanding general.

Finally, the amount of coordination, cooperation and liaison with other staff sections, adjacent, higher, and subordinate units, determines to a considerable degree the effectiveness and efficiency attained by the operations section in dispatching those duties and functions of the command for which it is responsible.

"A weak America cannot provide the strength which our country needs for the enforcing of a strong peace.

"To disenfranchise the atom bomb would be to provide the secret for those who cannot be trusted. The historical truth is that not in one year of recorded history has there been universal peace. As the spirit of the Lord watches over us in this atomic age, we must not listen to sermons of light and happiness. We must face the facts as we find them."

Colonel Henry Darlington

MILITARY NOTES AROUND THE WORLD

AUSTRALIA

Diver Seeks Sunken War Goods:

In Darwin (Northern Territory) a diver has started to salvage hundreds of jeeps, army trucks, and other military equipment with peacetime value, from the bed of the harbor. The cargo was in the American transport *Meigs*, which was sunk during an air raid in 1942. The diver has inspected the cargo, and he says that the vehicles are apparently in good order with the tires still inflated. He will moor them under water and raise them one at a time for special treatment before rusting starts in the air. All electrical equipment will be replaced and the motors started immediately to prevent corrosion. He also intends to look for the wreck of the American destroyer *Peary* which was struck by a bomb when zig zagging in the harbor. All efforts to find her have failed so far, and she is reported to have been carrying a valuable cargo of gold.

(*Australian Weekly News Review*)

GERMANY

Seven Steps Towards German Democracy:

General Joseph T. McNarney, the military governor, listed at a press conference at USFET Headquarters the seven conditions to be met by the German government before it will be considered as democratized. These conditions are:

1. All political power is recognized as originating with the people and is subject to their control.

2. Those who exercise political power are obligated to obtain a mandate by frequent reference of their programs and leadership to popular elections.

3. Popular elections are conducted under competitive conditions in which no less than two effectively competing political parties submit their programs and candidates for popular review.

4. Political parties are recognized as democratic in character and as volunteer associations of citizens clearly distinguished from, rather than identical with the instrumentalities of government.

5. The basic right of the individual, including free speech, freedom of religious preference, and the right of assembly, freedom of political association, and other equally basic rights of free men, are recognized and guaranteed.

6. Control of the instrumentalities of public opinion such as the radio and the press must be kept free from governmental domination.

7. The rule of law is recognized as the individual's greatest single protection against a capricious and willful exercise of governmental power.

(*German News Service, ICD*)

CANADA

Canada's Bid in Flying Wing:

The all-wooden two-place flying wing glider was developed by Canada's National

Research Council at Ottawa. The glider is forty-seven feet wide and weighs 3,500 pounds. It is being tested with intention of building a motor-powered flying wing four times as large.

(*Aviation News*)

INDIA

Paludrine, Enemy of Malaria:

A totally new drug has been discovered in Britain which might revolutionize the treatment of malaria. Not only is it more effective than quinine, or the substitute mepacrine, but it is also cheaper and easier to manufacture.

This new drug, which will be known as Paludrine, was discovered by a group of British research workers, employed by Imperial Chemical Industries. It is the result of an entirely new approach to the problem, for Paludrine does not belong to any family of drugs hitherto explored for anti-malaria activity.

Malaria has caused more deaths, and more suffering, than any other disease known to medical science. It affects no fewer than 300,000,000 people, and each year causes the death of 3,000,000 men, women, and children. It has, in fact, caused more deaths than the most terrible war; it has destroyed whole nations and defeated great enterprises.

Clearly, any discovery then which might reduce this terrible toll of destruction was of the utmost importance. This was foremost in the minds of the discoverers of Paludrine, when in 1942 they began their search for a new drug which would deal with malaria more effectively than quinine. They were not the first, of course, to seek for such a compound. During the past thirty-five years scientists have synthetized thousands of new compounds with this object in view.

Protective Properties

Yet from all this toil, only two compounds emerged which were of any value. These were Pamaquin and Mepacrine. And even these drugs failed in three basic essentials; first, that they should act as a preventive against malaria, second, that they should cure a patient actually suffering from malaria and, third, that they should prevent relapse, an all too common feature of the disease.

However, despite its short-comings, Mepacrine proved valuable in the treatment of malaria and was of vital importance to the Allies when the Japanese overran the East Indies. For it was from those Islands that the world got virtually all its supplies of quinine.

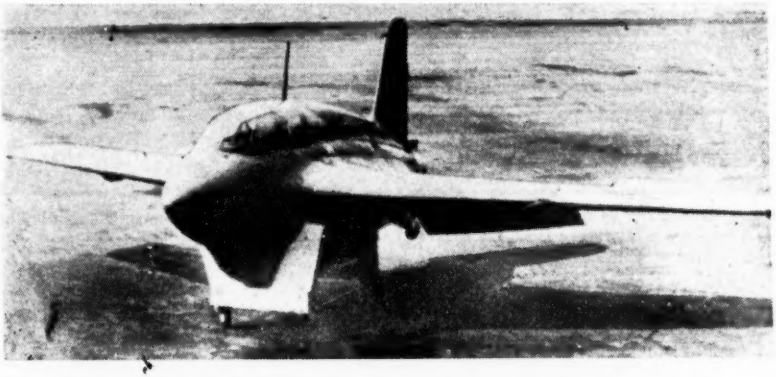
The synthetic compound of Mepacrine then came into its own, and well-qualified experts now believe it is quite as valuable as quinine in treating malaria and even, in some respects, superior to it.

Paludrine, it has been proved, is not only very effective in dealing with active malaria, but it is also most remarkable

in its protective properties against the bite of the mosquito. After further research to find the exact dosage required, it is believed Paludrine will afford complete protection to all who take it as a prophylactic. More prolonged trials are, however, necessary before its value in preventing relapse can be clearly established. But here, too, there is reason for optimism. Paludrine has been administered to many active malaria patients of the Liverpool School of Tropical Medicine, with very satisfactory results. More than one hundred cases of malaria were successfully treated, and then supplies of the drug were flown to Australia for far more extensive clinical trials. These confirmed that Paludrine was not only more effective than Mepacrine and quinine, but also that it produced fewer disagreeable reactions in the patients. Research still continues, but two things are already certain; Paludrine is both a triumph for science and a powerful weapon in the armory of those who fight malaria.

(*Indian Army Review*)

JAPAN



Jap Rocketeer:

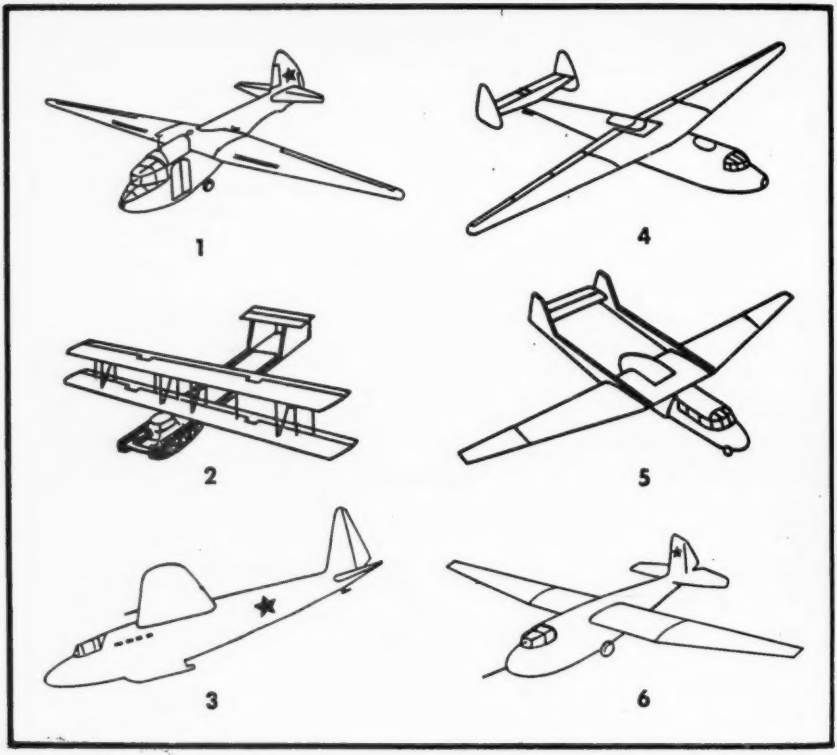
Only rocket-powered fighter Nips were able to build during war is *Shushui*, shown here. Intended for use by their Navy, craft never got into combat, although it did reach flight test stages. A reasonably close copy of German Me-163B *Komet*, *Shushui* has aluminum alloy fuselage with nineteen-foot length, thirty-foot wingspan, and 325-pound power plant using methanol and hydrogen peroxide as fuel.

(*Aviation News*)

USSR

Tactical Gliders:

Drawings (next page) depict a number of gliders used by the Soviet Union



during World War II. Figures 1, 3, 4, 5, and 6 show various types of troop carrying gliders, and Figure 2 shows the "Flying Tank" glider which was used to transport tanks to the combat area. These gliders were towed by ordinary combat planes.

(*Technika Molodeshi*, U.S.S.R.)

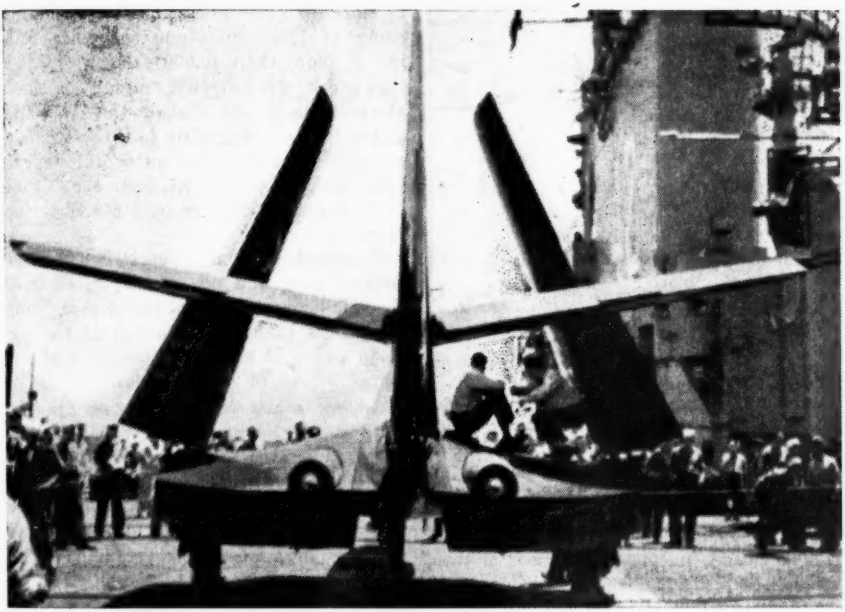
UNITED STATES

Jet Plane Carrier Landing:

The Navy's fastest airplane and one of the fleet's biggest ships teamed up in a preview of future naval air power as the first jet plane landings on an aircraft carrier were made while the giant FDR steamed into the wind sixty miles east of Cape Henry, Va.

The sleek, bullet-nosed McDonnell Phantom, FD-1, whistled down to five successful landings on the big carrier's flight deck in the historic test flights.

With an announced top speed "in excess of 500 miles per hour," the single-seat Phantom became the first propellerless plane to land on a U.S. Navy carrier. Now



in production for the Navy, the Phantom is designed as an interceptor and has a range of approximately 1,000 miles.

Unlike rockets, the twin axial-flow Westinghouse turbo-jet engines that power the Phantom, spray back heat but no flame. Unlike conventional carrier planes, virtually no warm-up is required and the Phantom is ready to take off almost as soon as the engines are started.

The Phantom loses or gains speed less rapidly than conventional navy planes but is easier to handle. The high-speed plane climbs rapidly and, with no propeller, gives the pilot better visibility and quieter flying without the torque caused by the motion of propellers.

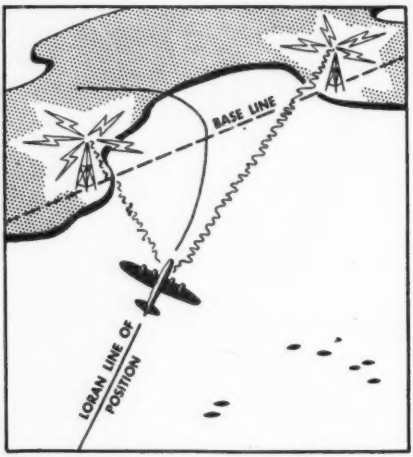
Carrying test instruments on the carrier flights, the Phantom weighed 8,800 pounds compared with a fighting weight of more than 9,200 pounds.

(*Science News Letter*)

Loran:

LORAN is a radar system of navigation developed and used for long-range flight during the war, principally in transoceanic navigation where vast distances encountered over the sea rendered radio communication impractical.

Special LORAN stations transmit increment radio signals, which, when picked up by airborne receiving sets, permit the navigator to determine the exact position of the plane. This is done by the navigator measuring the difference in time it takes the signals to reach the plane from two



Difference in time of reception from pair of stations determines Loran fix.

different sending stations whose locations are previously known. This data is plotted on a LORAN chart which shows time difference lines from the various transmitting stations.

By taking another reading from a new pair of stations the LORAN operator can plot a new line on the chart. The point intersection of the two lines shows the exact position of the aircraft. Distances determined by LORAN are accurate to within one per cent at a range of 800 miles at night and 1,600 miles during the day-light hours.

(From a news report)

XP-84 Performance Revealed:

The AAF's newest jet fighter, the XP-84 was revealed recently to have a speed of more than 590 miles per hour, a service range of 1,000 miles and a service ceiling of more than 40,000 feet.

A sleek, flush-riveted, highly polished aircraft, the XP-84 is about the same size as the P-80. Having a tip to tip wing span of 36 feet 5 inches and an overall length from nose to tail of 37 feet, the XP-84 is 1,000 pounds heavier than the Shooting Star.

Equipped with a tricycle retractable landing gear and powered by a General Electric jet engine, one of the most striking differences in outward design is the air scoop which is located in the nose of the plane instead of on the sides.

Among other features listed are the jettison-type bubble canopy which is electrically operated and permits the pilot to open the canopy at all air speeds prior to an emergency exit; a specially constructed pilot-ejection seat to provide emergency exits at high speeds; a pressure cabin fully air-conditioned to relieve pilot fatigue; and provisions for carrying wing-

tip mounted external fuel tanks to obtain maximum range with minimum increase in drag. The rear section of the fuselage is quickly removable to permit complete replacement of the engine in fifty minutes.

(*AAF Review*)

FOREIGN MILITARY DIGESTS

Fighter Aviation on the Western Front

Translated and digested at the Command and Staff College from a French article by Major J. M. Accart in "Revue de Défense Nationale" (France) January 1946.

Characteristic Features of the Air War During World War II

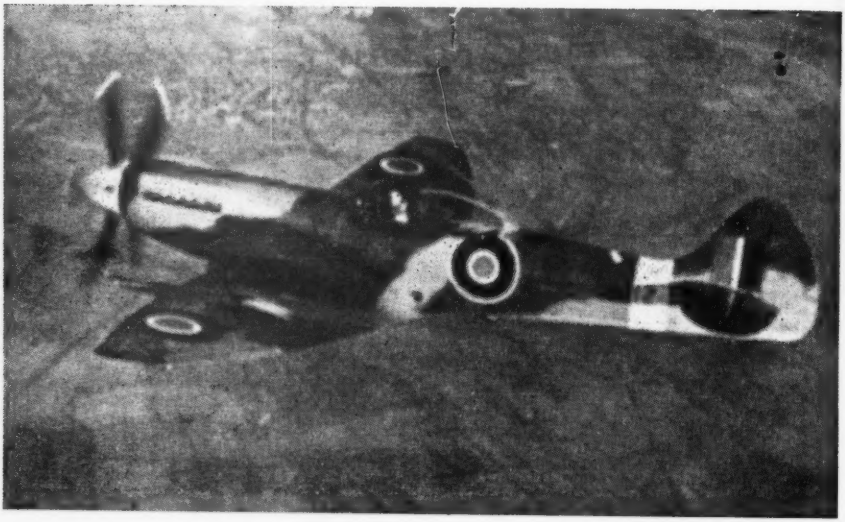
IF an outstanding Ace of World War I had written a book on his experiences he would have entitled it "My Air Battles." A pilot on the western front during World War II would have entitled a similar work, "Our Battles." Aerial combat has become more and more a matter of team work. That is the first salient characteristic of the aerial operations conducted by fighter aviation on the western front from 1939 to 1945.

A second characteristic is the absence of maneuver in the normal flying of the fighter plane. The fighter plane, generally a single-seater, used to be handicapped by an excessive "dead" angle to the rear. In order to be able to see and avoid surprise, it had to maneuver to obtain vision rearward. Many controversies had arisen on this question in 1939-1940. Was it necessary for the patrol as a whole to maneuver or for each plane in the patrol to maneuver; or, was it necessary for one plane in the patrol to be the shepherd dog charged with the task of watching over the rear? The final doctrine arrived at was imposed by the growing speed of planes and by the number of them engaging in a single operation. The application of this doctrine was rendered possible by the perfection of the radio sets carried by planes.

Fighter aircraft were no longer to engage in maneuver except for the purpose of avoiding antiaircraft artillery fire. The radio permits warning of all pilots as soon as an enemy is in view. The formation travels in a straight line which offers the advantage of being much less fatiguing.

The increase in the duration of the missions constitutes the third innovation. The fighter plane of 1914-1918, forced to remain close to the lines because of its short radius of action, gave way to the fighter plane which took off in England, accompanied bombers to Berlin, and returned to its base after having engaged in combat several times. This considerable range was made possible through the use of detachable supplementary gas tanks under the fuselage and wings.

A fourth characteristic is that fighter aircraft have been transformed into bombers. Fighter-bombers accomplished an



Spitfire XXII. (U.S. AAF photo.)

enormous amount of work over the whole of the western front.

A nucleus of purely fighter aircraft was conserved as an escort for daylight bombing raids and for the defense of armies and friendly territories. Why a nucleus? First, because German bombing aviation had almost totally disappeared by May 1944, also because the fighter aircraft of the Luftwaffe were giving themselves over to the defense of Germany, and lastly, because fighter aviation possessed a new tool which increased the efficiency of the fighter plane. The employment of this tool, radar, is the last event of special significance in the operations on the western front.

Electromagnetic detection of airplanes had been studied in France and England since 1933. In September of 1935 the first British radar station was in operation and was able to detect planes at a distance of fifty kilometers. Three years later, this distance was increased to 240 kilometers. It would be impossible to overestimate the importance of radar in aerial pursuit. We have often had the opportunity of appreciating the precision of radar. For example, while on patrol duty south of Caen the controller reported to us, from England, the presence of enemy planes: "A dozen Focke-Wulf planes are taking off from Rouen. They are heading for Caen . . . they are now ten miles southeast of your position, altitude 12,000 ft."—And, shortly afterward we caught sight of the formation.

The Campaign of France

The story of this campaign began during a sad period,—September 1939 to May 1940. Occasional battles occurred between fighter formations. On several occasions Curtiss P-36's of a speed of 500 kilometers per hour, armed with four or six light machine guns and

Morane 406's, making little more than 450 kilometers per hour mixed with Me-109's, which were faster by nearly 100 kilometers per hour and armed with two cannon and two light machine guns—but which were less maneuverable.

Real air action in the western theater of operations did not begin till May of 1940. In France, the fighting was of short duration, but deadly. The Germans launched their offensive supported by dive bombers on the lines and in the immediate rear; by medium and heavy bombers on the lines and on our vital centers and airdromes. These planes were nearly always protected by single motored Me-109's or by two motored Me-110's.

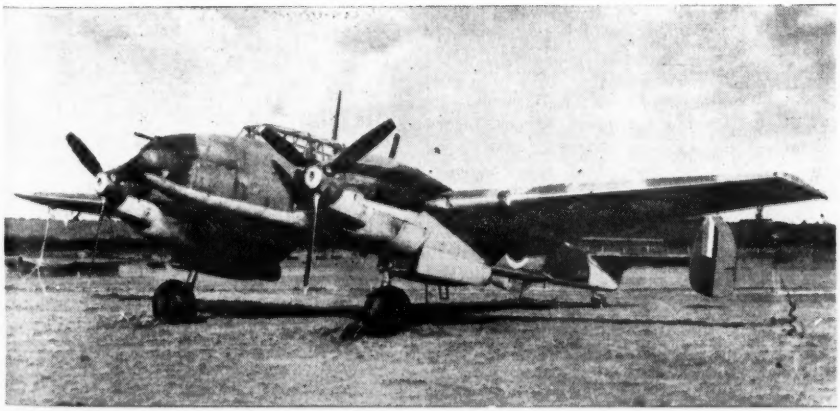
We were facing a fleet of 3,500 German bombers supported by nearly 2,000 fighter planes with but 420 French fighter planes supplemented by some thirty English Hurricanes. It was, without any question, the most difficult period of all for the French fighter aviation. After six weeks of fighting sixty per cent of our fighters had been lost.

When the armistice was signed, French fighter aviation had lost a great deal of its best elements, but it had paved the way for victory by bringing down nearly a thousand German planes and damaging still more. The first phase was terminated by a victory that was dearly paid for by the Luftwaffe.

The Battle of Britain

After a pause during which the Germans regrouped their forces and repaired the damage that had been done them, the Battle of Britain began on 8 August 1940. It lasted three months. During the course of this battle, 2,375 German planes were brought down by the Canadians, New Zealanders, Australians, Poles and English.

The majority of the fighter groups of the RAF were at that time equipped with Hurricanes, maneuverable planes with a speed of 540 kilometers per hour, whose eight light machine guns proved themselves in France. A few groups had already been assigned Spitfire I's which attained a speed of 585 kilometers per



Messerschmidt Me-110. (U.S. AAF photo.)

Messerschmidt Me-109. (U.S. AAF photo.)

hour and were armed with two 20-mm cannon and four light machine guns.

During the first phase, from 8 to 18 August, powerfully escorted masses of bombers attacked ports, merchant vessels, and airdromes of British fighter aviation. Twenty-six mass attacks were launched during the course of six days' time. A five-day period of relative calm followed during which Goering was engaged in reconnaissance and prepared his attack on English landing fields. From 24 to 30 August, he hurled his planes against the airdromes of southern England. The period of maximum intensity was between 7 September and 5 October, the objective being the destruction of London. On 27 September, 133 German planes were destroyed, 99 of them by fighter aircraft of the RAF. In the face of such losses, the Luftwaffe changed tactics. It was obliged to abandon mass attacks and to continue its work of destruction by the use of fighter aircraft and fighter-bombers. By 31 October the battle of England was won. It had come to its end gradually and was won at a cost of 2,375 German planes destroyed with their crews, as opposed to 375 British pilots killed and 358 wounded.

After their failure to succeed in daylight attacks, the Germans began to engage in night attacks. City after city was bombed and only a negligible number of bombers was brought down. Then in March of 1941, things changed regarding the night fighting. The British had perfected radar equipment carried by the planes. In a single week's time, twenty-two night bombers were brought down by the fighters. In April there occurred a further improvement. Between 6 and 12 April, thirty-three planes were brought down at night by the fighters,

and twelve by guns. This figure was increased still further the following month. Between 4 and 10 May, 102 planes were destroyed: eighty by night fighters and five by invading planes sent over German occupied French and Dutch territory.

British Counteroffensive

At the same time, the British assumed the offensive in daylight operations, with the intention of bombing certain important objectives and of destroying as many German planes as possible. These attacks, executed by a small number of bombers and many fighters, were likewise designed to keep the larger part of the Luftwaffe in the western theater of operations and in a permanent state of watchfulness and alarm. The bombers served as bait and were protected by a mass of some 200 fighters which rarely encountered more than thirty to sixty single-seater German planes which were thus forced to engage in a losing battle with the Spitfires before they could get to the bombers. During the summer of 1941, the Spitfire V appeared. Its horizontal speed and its maneuverability gave it the ability to pursue the Me-190.

During the first part of the year, 1941, spasmodic bombing attacks by Me-109 and Me-110 fighter-bombers had been carried out by the Germans on the south coast of England. They became less and less frequent in the face of the reaction of British fighter aviation. Similarly, in November of 1941, the British launched their Hurricane planes against France in dive-bombing operations, the "Hurribombers," armed with four cannon. In the face of the reaction of the German fighters they later dispatched these Hurribombers to the Middle East in support of the Eighth Army.

The balance of power, in the case of fighter aviation, slowly swung over in favor of the RAF, but the autumn of 1942 saw the appearance of a few experimental Focke-Wulf 190's. This plane was clearly superior to the Spitfire V. Its climbing speed was greater by a third that of the Spitfire, its diving speed likewise, and its horizontal speed was almost double that of the British plane at 8,000 meters. As for its armament, it reached, in the Model A-8, a total of two 13-mm cannon and four 20-mm cannon.

Throughout the whole of 1941, the pilots had been carrying out ground attacks by means of light patrols of fighter planes. The operation was carried out with a ceiling of from 400 to 600 meters. The fighters crossed the Channel under the clouds, crossed the coast of the continent at a place where the flak was not too dense and came out again in the interior of the country where they carried out their machine-gun attacks. On their return, the same process was employed. In case they were attacked by too great a formation of German fighters, they sought safety in the clouds. Numerous attacks, with the use of the plane's cannon were also made on shipping. When the fighters did not have to provide the bombers with an escort, they engaged in demolition and machine-gunning missions, ordinarily in wings of three groups. It is interesting to note the tactics employed by them in departing on a mission. In April of 1942, it was discovered that German radar was detecting the English fighters as soon as they took off from their bases. Thus the Messerschmidts and Focke-Wulfs were in the air ready to intercept them.

Since long-range radar is unable to detect planes close to the ground, the Spitfires remained close to the ground after taking off, and the inhabitants of Dover often saw several groups at an altitude no greater than the tops of the cliffs, or less than 100 meters above the surface of the water.

The formation then moved, close to the

P-47N in flight. (U.S. AAF photo.)

surface of the water, to within thirty miles of the French coast, rose from this point at top speed, and crossed the coast at an altitude of between 4,500 and 7,500 meters.

Air Supremacy to the Allies

In July 1942, the Spitfire V was improved by the employment of a supercharged motor. It was then the equal of the FW-190 up to 3,000 meters. But the great change came in September with the arrival of the Spitfire IX, which constituted a veritable catastrophe for the Luftwaffe. Resembling the Spitfire V to a point where it could be mistaken for it, it dominated the Focke-Wulf and the Messerschmidt, some of which were shot down at altitudes of over 10,000 meters. The summer and the autumn of 1942 marked, therefore, a decisive turning point in the pursuit battle over the western front. On 27 July 1942, American forces equipped with Mustangs went into action for the first time. The Mustang was a single-seater, single-motored plane of a weight of three and a half tons, armed with six heavy machine guns. The speed of the first type was 590 kilometers per hour. It was soon replaced by the Mustang P-51B, equipped with a motor of 1,500 HP which gave it a speed of more than 640 kilometers per hour. On 17 August, the Allied fighters escorted the first raid by flying fortresses over Europe, at Rouen. It was a beginning which marked a specialization on the part of American fighter forces: long-range, daylight escorting. The need for the protection of bombing planes forced the Americans in the direction of the development of a pursuit plane with an extremely great radius of action, which plane was to be equally indispensable to them in their operations in the Pacific. Alongside the Mustang P-51B,

appeared the Thunderbolt P-47, with a single motor of 2,000 HP which carried its seven tons at a speed in excess of 646 kilometers per hour. It bore a formidable armament of eight heavy machine guns and its ceiling exceeded 12,000 meters. The Lightning P-38 was likewise very valuable as an escorting plane and for use in ground machine-gunning operations. With a speed approaching that of the Thunderbolt, it was armed with one 20-mm gun and two heavy and two light machine guns.

It is interesting to note that the activity of the Anglo-Americans in January kept fifty per cent of the German fighter aircraft on the western front, with twenty per cent in the Mediterranean area, and thirty per cent in Russia. Hence, it was over Germany that the last great fighter battles occurred, in the place where the Luftwaffe had concentrated its defenses. The beginning of 1944 saw the defeat of the German fighter forces.

The production of German planes in March 1944 was smaller than in August of 1942. In April it was still less. The Luftwaffe could not again regain its air supremacy, even over its own territory, for it no longer possessed enough fighters. The daylight raids on Berlin were started in March, accompanied by fighters, and 1,300 German planes were brought down

P-38 Lightning. (U.S. AAF photo.)

during the course of the air battles over Germany during April by the 8th and 15th Strategic Air Forces. In May the attacks were directed against the synthetic gasoline and oil works. Allied air supremacy was complete and paved the way for the Normandy landing.

The Normandy Landing

The role of fighter aircraft in the Normandy landing merits special attention on the strength of the fundamental axiom of modern strategy: "No naval, ground, or amphibious operation without air supremacy." The Allies, not satisfied with their air supremacy, organized their landing under a veritable "umbrella" of fighters, which was intended to maintain total mastery of the air over the landing zone from daybreak to nightfall. The missions to be fulfilled were numerous: aerial protection before, during, and after D-day, of the zone of embarkation, of convoys in the Channel, of the zone of approach; protection of large battle ships; protection of heavy and medium bombers; protection of airborne forces and paratroops.

Over the attack zone alone, six groups of Spitfire fighters were maintained at between 900 and 1,500 meters altitude and three groups of Thunderbolts at around 2,500 meters—a total of 110 planes which continued to fly over the beach from a half hour before dawn till a half hour after nightfall. Night protection was provided by the patrols which completely surrounded the attack zone. Night fighters, generally Mosquitos, were equipped with the latest radar apparatus which permitted them to bring down a plane without seeing it. The American fighters of the Eighth and Ninth Fighter Commands, worked alongside the fighters of all nationalities of the RAF, which committed the Tenth, Eleventh, and Twelfth groups, the Air Defense of Great Britain, and the Eighty-Fifth Group.

In the face of this development what was the reaction of the German defense? At 0900 on 6 June, a lone Focke-Wulf flew over the attack zone. At 1500, twenty Ju-88 bombers, escorted by fifteen FW-190's attempted to bomb the beaches and the landing boats. The fighters of the Eighth Fighter Command, on duty at a higher level brought down fifteen of the twenty Ju-88's and four FW-190's. In the evening, the Allied fighters protected a column of transports with paratroops and gliders which extended over a distance of eighty kilometers. A lone FW-190 was encountered and shot down. On 7 June, the presence of twenty Ju-88's, one Heinkel 177, twenty-eight FW-190's, and ten Me-109's was noted. Fifteen Germans were brought down and eight damaged. The German fighters mixed in among the planes which were covering troop movements in the rear. Allied groups were dispatched with the mission of destroying them. They brought down sixteen planes plus eight probables with the loss of nineteen pilots. On 8 June a hundred FW-190's were discovered and thirteen of them brought down.

The collapse of the Luftwaffe was thus consumated. We must however, set down to the credit of the German fighters one last spasmodic effort. On 1 January 1945, 500 to 600 FW-190's and Me-109's were sent during the morning hours to attack Allied airdromes in France, Belgium, and Holland. The Germans lost 300 planes, but succeeded in destroying 155 Allied planes. This supreme effort did not in the least interfere with the development of operations, but illustrates the fighting spirit of the Luftwaffe.

The Fight Against the Flying Bombs

One chapter, and a very special one, in the operations of fighter aircraft over the western front, was the battle against the flying bombs. The fighters participated in

the battle in three ways: by accompanying the English medium bombers and night bombers which attacked the launching sites before the beginning of the V-1 offensive and while it was in progress; by themselves bombing the launching sites and above all, by directly attacking the bombs while in flight.

By 31 August 1944, 1900 flying bombs had been brought down by the fighters. Here again, fighter planes had provided the most effective, direct defense.

German Plans for the Invasion of Sweden: Operation "Polar Fox"

Translated and digested at the Command and Staff College from an article by Lieutenant General Rudolph Bamler in "Krasnaia Zvezda" (U.S.S.R.) 26 June 1946.

The 26 June 1946 issue of "Red Star" published an article prepared by Lieutenant General Rudolph Bamler for the Government of the USSR. This statement describes in considerable detail German plans for the invasion of Sweden. General Bamler was Chief of Staff of the German forces of occupation in Norway (commanded by General Falkenhorst) from May 1942 to May 1944. In describing the German plan, General Bamler mentions dozens of prominent civil and military leaders in Germany, Sweden, and Norway who participated in the development of the plan. For obvious reasons, however, the MILITARY REVIEW publishes only those portions of General Bamler's statements which deal with tactical and strategic aspects of the operation.—The Editor.

IN December 1942, I was ordered to prepare a plan for the invasion of Sweden from Norway. The first draft was to be submitted within eight weeks, or not later than February 1943.

I was told that the forces then in Norway could be reinforced by no more than three divisions; that there were considerable stores of food in Norway, which were to be utilized for the operation, and that all work in connection with the planning and preparation of the attack should be done in absolute secrecy.

Strategic Considerations

The following questions were to be considered:

1. Will the English attack in order to compel us to withdraw part of our forces from Sweden and if so, where? Would the English invade Norway, Denmark, or the south of Sweden, or would they confine their activities to strengthening the Swedish resistance by employing their air and naval forces only? If so, how much of each?

2. What was the strength of the Swedish Army? What was its armament and equipment, its command and combat ability?

3. What was the supply situation in Sweden and that of the German forces in Norway?

4. What was the position of the Swedish Government? What was the attitude of the people? Would they really defend their neutrality against any invader as had been repeatedly asserted in the Swedish press?

British Threat

On the basis of the intelligence at the disposal of the commander of the German forces in Norway we concluded that the invasion of Norway, Denmark or southern Sweden by the British was possible. We believed, however, that the necessary large forces would not be concentrated in time, if our operation was carried out unexpectedly and swiftly enough to allow us, within about ten days, to use our reserves in any threatened direction.

We had to consider the possibility of intervention on the part of British air and naval forces, and even the use of some of their air forces from Swedish bases. This, however, would have called for the simultaneous transportation to Sweden of a large quantity of gasoline, for Sweden, as we knew, had but very small stocks of aviation fuel. That is why we were not afraid of the arrival in Sweden of any large British air units.

In any case, it was considered necessary, in view of the vulnerability from the air of our motorized units operating on narrow mountain roads, to seize as fast as possible, or to destroy, the most important airfields in Sweden.

Swedish Army

The Swedish Army had been considerably strengthened and improved. The intelligence we possessed, based chiefly on the reports of the German military attachés in Sweden, showed that by the spring of 1943 Sweden would have about ten divisions, that is, ten Swedish mobile brigades. On the basis of this information we calculated that, within a month after the proclamation of general mobilization, this number would be increased to about twenty-four brigades. Besides, we had to take into account the Swedish territorial defense organization, a sort of *Landstrum*, which was, however, poorly armed.

The army had not been sufficiently trained to hope for successful offensive operations involving the employment of large combat forces, but in defending its own country, it had to be looked upon as a formidable enemy. Its soldiers were disciplined, well trained in the use of fire arms, and knew the terrain far better than we did.

Among its weaknesses were the schematism of its company-grade officers and noncommissioned officers due to insufficient preparation; lack of heavy infantry weapons, and inexperience in their use, as well as a lack of heavy artillery and heavy antitank guns; small obsolescent and inexperienced tank forces; motor vehicles with gas-generating engines and therefore easily vulnerable; numerically weak, though good air forces; and a weak antiaircraft artillery. Basically, the army did not possess any combat experience. It is true, however, that its combat preparedness was improving from month to month. The Swedish navy was rated much higher than the army.

Thus, it was believed that the element of surprise combined with a concentrated fire of all types of weapons—even under the condition of numerical inferiority, would enable the German troops, with their combat experience and modern matériel during the first few days, to deliver a telling blow upon the Swedish army and air forces and disorganize them. We planned to upset the mobilization activities by the destruction of railroad centers, large power stations, and the few military industrial plants Sweden had at that time.

Plan of Operation

The plan of the operation called for an attempt to prevent the various Swedish groups from coordinated action. These groups were separated from each other by terrain features. One of the weaknesses of Sweden was the fact that the country received its coal and oil by water, and its iron ore from Kiruna in northern Sweden,


North Cape
ATLANTIC OCEAN
Narvik
Kiruna
NORWAY
SWEDEN
FINLAND
U.S.S.R.
Boden
Haparanda
Gulf of Bothnia
Ostersund
Trondheim
Röros
Sundsvall
Soderhamn
Elverum
Avesta
Helsinki
Oslo
Frykstad
Uppsala
Leningrad
Carlstad
Stockholm
Halden
Lake Vaner
North Sea
Göteborg
Gottland
Kalmar
Riga
DENMARK
Copenhagen
Malmo
Baltic Sea
U.S.S.R.

which had to be isolated immediately. Furthermore, the suddenness of the first attack and of our successes, and the propaganda on the subject of the uselessness of continued struggle with the superior enemy were to paralyze the will to resist of both the people and the government.

We counted on some assistance from a number of individuals in key positions and from a considerable part of the Swedish officers' corps known for its sympathies with Germany. We also counted on the pro-fascist circles of Sweden.

These and other political considerations made General Falkenhorst believe that Sweden would capitulate before the decisive battles for the capital of the country.

The transfer of our units from the Norwegian coast called for a series of precautions and a special plan, as well as for a regrouping of the forces. The plan had to provide for secret and concealed concentrations of the participating units and for bringing up new units from the continent. This was difficult especially because the Swedish-Norwegian border stretched for hundreds of miles; it was very poorly observed, and was actually open through its entire length.

We could counter these difficulties only by spreading rumors about a wide replacement of the units stationed in Norway by those from the eastern and western fronts. Such tactics, but on a smaller scale, had been employed by us in other countries.

Disposition of Swedish Forces

We believed that upon the completion of the mobilization, the Swedish forces would be distributed about as follows:

a. One large group (about four divisions) in the vicinity of the northern shore of Lake Vener with the mission of blocking all roads which we might conveniently employ for our advance from Oslo.

b. About two divisions in northern Sweden, garrisoning Boden.

c. Between these two groups, forming a connecting link, two or three divisions around Ostersund to cut routes of communications with Trondheim.

d. Another larger group (three or four divisions) in the vicinity of Göteborg-Malmo-Kalmar.

e. About one division in Gottland.

f. Main strategic reserve to the east of the lakes around Stockholm (about five divisions).

g. The remaining forces to be used for the protection of the coast and borders or to be formed into motorized units and attached to other groups about which we had no accurate information.

General Falkenhorst's Plan

Considering the different possibilities suggested by the disposition of the Swedish forces, terrain, missions, and the necessity for utmost secrecy in the assembly of the troops and the attack itself, the commander of German Forces in Norway suggested this plan of operation:

1. Main effort was to be made by a tank corps (two tank divisions and one motorized infantry division) followed by three infantry divisions, from the area east of Trondheim-Roras (in spite of comparatively poor condition of roads) through Ostersund toward Sundsvall.

Mission: to rout the group near Ostersund before it could be reinforced from the south, to cut off northern Sweden with its industries at Kiruna, and to establish direct contact, through the Gulf of Bothnia, with the German troops in Finland.

This attack was to be supported by the following operations:

a. Reinforced infantry regiments were to attack from Narvik toward Kiruna;

b. One German infantry division was to advance from Haparanda, Finland, to Boden;

c. One German division from Finland was to land at Soderhamn.

d. Parachutists were to land near Kiruna and Ostersund.

Having reached Sundsvall, the tank corps was to be reinforced by at least one infantry division. One infantry division stationed at Soderhamn would then turn to the south, while the tanks would advance toward Avesla. The left wing of the corps was to move along the coast. This penetration to the south was at first to be covered from the north by one or two infantry divisions following the corps. The main body of the infantry divisions was to follow the right wing of the tank corps being echeloned to the right rear.

2. At the same time, a small force (two infantry divisions) was to set out from Oslo and to advance towards Carlstad. Its mission was to immobilize the main group of the Swedish forces and at the same time to cover the north flank of the Third German group. Later on, this second group was to come under the tank group.

3. The third group (three infantry divisions), covered by the second group and Lake Vener, was to advance south from the area of Halden-Frykstad west of Lake Vener. Its main mission was to take Göteborg.

The offensive was to be supported by at least one division from Denmark, operating south of Göteborg. Besides, by means of various demonstrative actions (increased railroad transportation, stepped up radio activity, smoke screens, employment of artillery, false landing operations, etc.), which were to give the enemy the impression of an attack on Malmo, the Swedish forces stationed at Malmo were to be prevented from an immediate movement to Göteborg or to the north.

For the same purpose there was planned a landing operation at Gottland. Together with the garrison of the Aland Islands, this landing force was to tie down the troops of the Stockholm group.

4. At least one infantry division was to be held in reserve near Elverum.

Further Development of the Operation

The operations to be undertaken after the chain of lakes near Stockholm, or the region around Göteborg was reached, were to be worked out after the commitment of the main Swedish reserve. One alternative was to advance on Stockholm through Uppsala, having first tied the southern Swedish group; or to attempt to cut off Stockholm and advance with the main force along both sides of Lake Vener in the general direction of the Province of Gottland in order to destroy the southern Swedish group and to occupy the region, which was especially valuable to the economy of the country.

At the very beginning, our air forces were supposed, by sudden and concentrated blows, to destroy or cripple Swedish air forces and air fields, as well as main centers of communication. The Baltic fleet was to paralyze the Swedish navy, support and protect the landing operations at Göteborg, Soderhamn, and Gottland. For this purpose, if necessary the German fleet was supposed to set out against the Swedish Navy shortly before the beginning of the ground attack. In addition to this, the fleet would secure the transportation of reinforcements to Norway and protect routes of communications. Naval and air forces were supposed, also, to carry out intensive reconnaissance of the British Isles.

This operation was called "Polar Fox," and in the document attached to the plan there was stated that the most favorable time for carrying out this operation was June-August or the period from the middle of April through May. The same document specified that the number of divisions called for in the plan was the necessary minimum required for the completion of the operation against the Swedish in the shortest possible time. General Falkenhorst emphasized that he would not be responsible for depriving the Norwegian coast of its garrisons in

view of the serious threat of possible landings by British troops in Norway.

Further, the document noted the possibility of a prolonged interruption in the flow of ore from Kiruna to Germany in the event Sweden managed to destroy her industries and railroads.

In view of long distances, difficulties in transportation, and the necessity for secrecy, preparation of the operation, it was stated, would require considerable time. It was requested to set the date for the beginning of operations as long before D-day as possible.

The date for the operation however was never decided upon. Some believed that the operation had to be carried out not in summer or spring, but in winter when all lakes are frozen and can be crossed easily.

There were other changes in the original plan which called for fewer divisions, in view of the fact that there was some uncertainty as to whether or not it was possible to transport the required number of troops to Norway. These changes were later approved by the high command. The navy, by the way, insisted on carrying out the operation in the winter. Naval experts believed that the British landings in Norway were less probable in winter.

Following the disastrous summer campaigns of 1943, however, Operation "Polar Fox" was forgotten.

The Air Defense of Great Britain

Digested at the Command and Staff College from an article by Air Marshal Sir Roderic Hill in "Journal Royal United Service Institution" (Great Britain) May 1946.

DURING the war of 1914-1918, whatever forebodings haunted the higher naval and general staffs, and in spite of the unwelcome attentions of the German naval airships under cover of darkness, the people of this country slumbered on; a little uneasily perhaps, but with a fair illusion of security against air attack. One day in 1917, the morning of 13 June, they were awakened with a shock which sharply marked the end of an era.

The citizens of London became aware of a resonant droning in the high summer haze and some of them vaguely wondered why our machines were so active. A few minutes later, the whine and crash of bombs were heard—small bombs, it is true, but 162 men, women and children crowding the streets with innocent curiosity were violently and sensationally killed. The bombs from fourteen Gothas stationed at St. Denis Westrem and led by Hauptmann Brandenburg caused more casualties in this raid than all those inflicted on London by the zeppelin attacks up to that time.

Lieutenant General Jan Smuts, since become the renowned Field Marshal, then a recently appointed member of the British War Cabinet, was in his room at the Savoy Hotel. He saw the German Gothas out of his window, and when the raid was over he visited the scenes of what we have since euphemistically come to describe as "incidents." He was deeply concerned not so much by the sights that met his eyes, as by what his imagination conjured up: events that would assuredly come to pass now that their possibility had been demonstrated. He saw the writing on the walls of London.

That afternoon the cabinet met. Frequent and anxious discussions ensued. A fortnight later, on 2 July, a proposal to double the size of the air service was approved. Meanwhile, events moved fast. On Saturday, 7 July, a second raid on London took place, killing fifty-four and

injuring 190. This, however, was not the most serious aspect of the case. The main cause for alarm was the futility of our unorganized defense. Although seventy-eight of our aircraft took off to repel the raid, only one Gotha was shot down and the fire of our antiaircraft guns failed to break up the enemy formation. Considering the technique of those days, the bombing was remarkably good. This was mainly because the Gothas were not effectively opposed. In his report the German leader Brandenburg wrote: "Our aircraft circled round and dropped their bombs without hurry or trouble."

The country as a whole was indignant and mortified, and these raids were the means of bringing home to our people that, for the time being, the enemy possessed offensive weapons to which we had no effective counter. Experience could not help us, for there was none. It was on us to think anew and devise our own salvation.

The Smuts' Memorandum

On 11 July, the cabinet decided to set up a committee, with the prime minister as chairman, to report on home defense arrangements in particular and on air organization and the direction of air operations in general. The prime minister had no time to lend more than his name, and the main responsibility fell on Smuts.

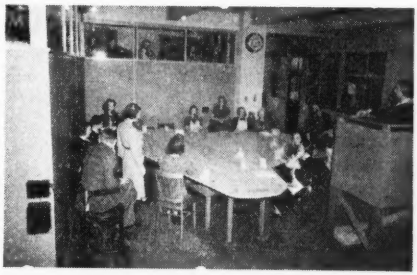
Smuts lost no time. He submitted his two reports—the first on home defense on 19 July, and the second, covering the broader issues, on 17 August. As far as the air force is concerned, this second report is an historic document. It foretold the inception of a unified air service and contained the following words:

"But careful staff work is here in the terra incognita of the air even more essential than in military and naval operations which follow a routine consecrated by the experience of centuries of warfare."

He saw that air operations as a whole, and air defense as one part of them, required unified direction and a thinking machine behind it which could sift the wheat from the chaff. I have recalled the two raids of 13 June and 7 July 1917 and their effect, because though small in themselves, they formed the first essential piece of background to our story of air defense.

Inception of the Air Staff

As one result the air staff was set up. Between 1918 and 1939 the effect of this new venture became visible until, at the end of the period, on the outbreak of a second war, they were fully apparent. As a whole, and as always, we were unready, but in so far as we had made preparations, air defense was well ahead. Even in air defense during those lean years it was often like selling a lot of things you haven't got to a lot of people who don't want them.



An Air Warning Center.

Air Defense Considerations

Before I go any further, perhaps I ought to mention something about air defense generally so that, when going into subsequent detail, we can preserve a sense of balance. Security of our island base is universally realized as fundamental.

Indeed, our ability to continue to conduct war against a major power or group of powers depends on this. In the Battle of Britain, victory was only the beginning of a gigantic offensive effort; but defeat would have meant the end of the war.

It follows that in respect to such forces as we maintain for air defense, we must keep them ready to fight. The Admiralty has always worked on this principle in relation to our first line naval forces.

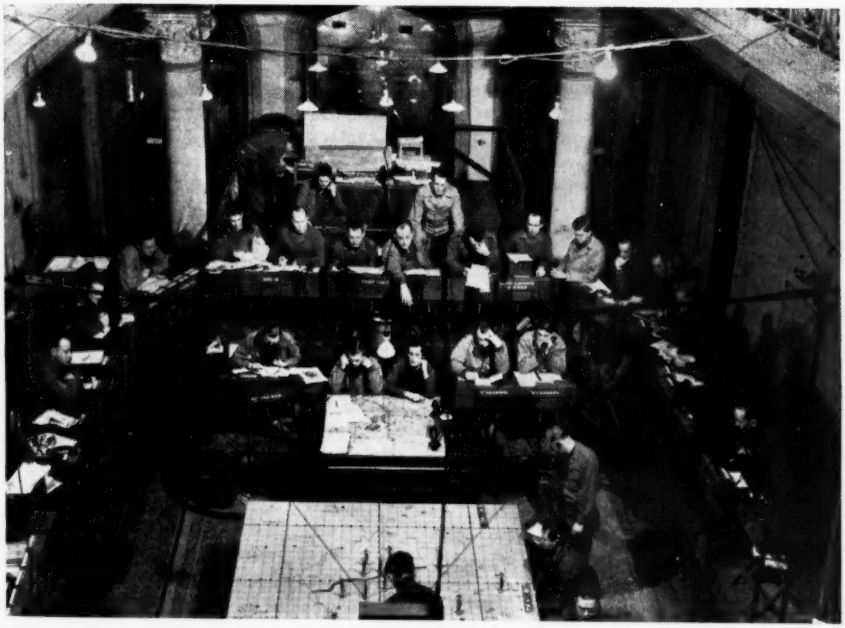
The problem of defending these islands from air attack can never be isolated from the conduct of air, sea, and land operations elsewhere. The function of the defense is to enable us to endure the enemy blows until we can ultimately gain a decision by offensive action. But the best way to defend ourselves is to strike out boldly at the enemy as soon as our strength is sufficient, with the Navy, Army and Air Force acting together. Moreover, used purely defensively, the aircraft is at a serious disadvantage. It is at its best as an offensive weapon and needs the initiative to exploit its flexibility and penetrative powers.

Another point is this. Defense against air attack if it comes, is a highly composite activity in which a number of arms are employed in concert. That word brings to mind the analogy of an orchestra. Now, an ochestra in which all instruments were not closely and intimately controlled by one conductor would be chaotic. Similarly, an air defense organization consisting of aircraft, guns, searchlights, balloons, radar reporting stations, observer posts, decoys, and countermeasures that did not respond quickly to the wave of the baton would be impotent in the face of a well-planned air attack. While it is true that in listening to an orchestra we can detect varying degrees of merit in the way the different instruments are played, yet the performance of a piece of music like a symphony has, in the last resort, to be judged as a whole. Some of our worst operational conundrums arose through difficulties in orchestration.

My third point is that the power of the nation to endure bombing is largely dependent on good organization and the stoic virtue of the civil population, so that a supremely important part of air defense is what we call Civil Defense. The main Civil Defense measures were: black-out, warning sirens, including a special factory alarm system, bomb disposal, demolitions, evacuation of casualties, first-aid repairs, and construction of air raid shelters. All this vast effort, so much of it inconspicuous and voluntary, became, I think, the admiration of the world. Without it, the casualties and moral effect of air attack would have been far greater, and it was in every sense complementary to the active defense with military and air force weapons.

The Organization of Air Defense

Let us turn again for a moment to the active defense system. When the organization was fully developed towards the end of the war, the whole country was divided up into about twenty fighter sectors controlled by five fighter groups under Fighter Command Headquarters. Ultimately the control of all weapons was based on two delicate and complex organizations: the raid reporting system and the communications system. In 1944, we had about 250 radar reporting stations around our coasts with some inland, to track enemy aircraft coming in over the sea, and a network of over 1,400 Royal Observer Corps posts to plot aircraft flying over land. We had also a vast network of communications, radio telephony and land lines. These were necessary, because instant control had to be exercised over between 600 and 1,000 aircraft, 3,000 guns, 3,000 to 4,000 searchlights, and 2,000 balloons. The nerve ganglia of the system were the operations rooms at



Fighter control center of a TAC Headquarters in Europe. (U.S. AAF photo.)

headquarters of fighter command, fighter groups, and fighter sectors.

The complexity of this organization was dictated by the time factor. At 200 miles an hour it took enemy bombers only fifteen minutes to reach London from the coast. At 300 miles an hour it took only ten minutes. Time being the essence of the problem, every commander at headquarters of groups and sectors, according to his sphere of responsibility, had to have enough information to produce a physical display in his operations room so that he could issue his orders to aircraft, guns, searchlights, and other weapons in time. The unique vulnerability of some of our vital targets, especially London, in relation to the far-flung crescent of German bases ringing us forced us to go on developing this intricate and highly responsive mechanism. At its zenith in 1944, it reached a remarkable pitch of scientific and military ingenuity. As the German bomber pilots freely admitted, the defense was pretty hot. Earlier in the Battle of Britain, all the elements were there, but they were, of course, more rudimentary.

Night Interception in 1943

The technique of night interception needed on one hand a great scientific effort, and on the other much specialized training of pilots and radio navigators. Consequently, it was developed slowly and somewhat painfully. The problem of detecting, intercepting, and identifying an enemy aircraft at night was far more severe than that of attacking him. For one thing, the final approach had to be done by visual means, and the range at which this was possible varied tre-

mendously with background and with what sort of a night it was. In moonlight, it might be half a mile; on a dark night against a starlit background perhaps 200 yards. It was found that, in general, the only way to bring off an interception was to get behind and overtake in the same direction as the enemy was flying. Recognition had to be by silhouette and the danger of shooting down a friend was ever present. The function of airborne radar was to enable the attacker to get within visual range and, if he lost sight of the target, to regain it.

The defense worked on the same principles as it did in the Battle of Britain, but in 1943 we observe an advance in organization. When the group commander has planned the battle and deployed the forces, the sector commander takes them over, but a regular procedure at night is now to delegate the responsibility for detailed interception to the G.C.I. (Ground Controlled Interception) station with its highly organized radar display.

The Spirit of the Air Defense

I want to emphasize that in the study of air defense it is most important not to overlook the point of view of the men who actually do the job: the air crew, the controllers, and the flight and squadron commanders. Neither organization nor plans which do not come to grips with practical issues are likely to work or to command the confidence of the men at the business end.

From 1943 onwards, the same work was carried on until, after a last effort by the Luftwaffe in the Spring of 1944, the enemy bombers no longer ventured, at least in any numbers, over our coastline. Meanwhile, ever since the Battle of Britain, new and improved types of aircraft had been coming into service.

Though equipment improved, one factor remained constant throughout. It was the spirit that imbued air crew, anti-aircraft gunners, balloon operators, controllers, signallers, and maintenance crews alike. In Fighter Command we used to call it the 30-second complex. It is exemplified in the following anecdote. Recently we have been giving a lot of attention to what is called planned maintenance and planned flying. The idea is to run the show with due regard both to operational efficiency and to maintenance resources. A class was in progress where some air crews were being taught this subject. The instructor asked one of the class a question. He said, "If fifty enemy bombers were reported approaching your airfield, and you had twenty-four fighters serviceable with pilots, and eighteen were ordered up to intercept, how many would there be left?" The student replied without hesitation "None." "Come, come," said the instructor, "that surely is not right. There would be six left." "No, Sir," said the student, who happened to have been in Fighter Command, "You may know arithmetic, but you don't know the Fighter boys."

Reflections on the Future

After our recent experiences, the future does not put most people into one of their happier moods. It makes me think of the farmer who wanted to insure his barns against fire. The insurance agent came to see him, and after looking round for a bit, asked the farmer what means existed in the village for putting out fires. The farmer scratched his head and thought for a long time. Then he said, "Well, sometimes it rains." Now that outlook will not do for us. We have just got away with it twice, the last time only by a very narrow margin. The third time, if we were insufficiently prepared, our luck might not hold.

In my opinion, however, there is no reason why any one need think like the farmer I have just mentioned. Among much that is uncertain, of this I am sure:

what may happen in the future is not entirely a matter of chance; it depends very much on what we decide to do now.

Let us face the problem squarely. A good air defense is very costly; but a bad air defense is ruinous. It is at least clear that whatever we do have, in quality it ought to be the best we can afford, for we can afford only the best; it ought also to be a little more than ready, for it should if possible, be a lap ahead. It should be remembered that the last word on the problem of interception is never said, and that all target-seeking missiles contain the seeds of their own destruction. However much we are able to keep the technique of air defense in the forefront of technical progress, it is no use pretending that it can be a substitute for the offensive use of air power. The best deterrent to armed aggression, and indeed the only real answer to it, is the science, the strength, and the confidence of our punch. And this truth will deepen as the destructive power of weapons grows.

Since we enjoy the doubtful privilege of inhabiting the most vulnerable target in the world, its general characteristics should be of more than passing interest. Consequently, I think it is worth while taking a glance at the relationship of air defense with the future growth and texture of the British Commonwealth and Empire. I am going to suggest a metaphor. Let us call these islands, and particularly London, the stomach of the Empire. At least the stomach in relation to the body, and Great Britain in relation to the Empire, have some points in common; first, in respect to their lack of natural protection, and second in respect to their service to humanity as a focus of morale. Now it is inconvenient to fight anyone who may hit you below the belt, but having to fight and defend your stomach with indigestion at the same time is really awkward.

In this connection, it is well to bear in mind a few simple facts. The land area of the British Isles is roughly 100,000 square miles and contains forty-eight million people, of whom eight and a half millions are crammed into the 700 square miles of Greater London. The land area of the Commonwealth, if you exclude India, is thirteen million square miles and its population is 150 million. Hence, whereas Britain contains nearly one third of the population, it is about 130 times as small. It is not unreasonable to conclude that as a stomach it is overfilled. We might even go so far as to admit that we are suffering from a considerable amount of social, economic and industrial indigestion.

Common sense would seem to suggest that it would be to the mutual advantage of various members of the Commonwealth if we did what we could to spread out a bit more evenly. Deliberate creation of alternative sources of supply and manufacture in the countries of the Commonwealth, linked up by improving communications, would be a form of strategic dispersion. It would not only ease the problem of air defense, but would assuredly promote Imperial health.

In the unhappy event of peace breaking down, it would be much harder for an aggressor to inflict crippling damage—indeed there would be less temptation to try it—on a system without such a supersensitive solar plexus.

Photo-Intelligence in the Infantry Division

Translated and digested at the Command and Staff College from an article in Portuguese by Major Hugo de Mattos Moura in "A Defesa Nacional" (Brazil) May 1946.

ONE of the great lessons which I learned during the war was the possibility of obtaining precise data of primary value concerning the enemy through photo-intelligence. This data enables us to study the possible reaction, and to foresee the nature and intensity of the opposition which we can expect to encounter before an operation actually begins.

Everything which the eyes of the technician discover, and all of the data which the photo-intelligence officer furnishes the G-2 Section, makes possible the drawing of a number of conclusions of inestimable value, from the tactical point of view, for the infantry division.

Let us consider, in general, some of the questions dealt with by photo-intelligence, when the First Expeditionary Infantry Division was facing an enemy which was dug in on high ground taking advantage of every favorable terrain which allowed him to dominate our positions by fire and observation. The enemy position barred our progress along Highway 64, on the road to Bologna.

Let us review those elements of photo-intelligence which were utilized by G-2 after the study and evaluation of these within the tactical situation of the First Expeditionary Infantry Division.

The photo-intelligence sub-section was always ready to furnish the following:

Annotated Prints

Overlapping vertical photos of the zone in which we were operating were furnished by corps. These consisted of pairs of photos which were utilized by the photo-intelligence interpreter for study with the aid of a stereoscope. The sub-section then prepared these, marking ridge lines, streams, and certain other details which were important to the execution of the given missions.

These photographs give a much clearer idea of certain features than can be obtained from a map. Wooded regions, forests, buildings in a given locale, road conditions, etc., are easily identified.

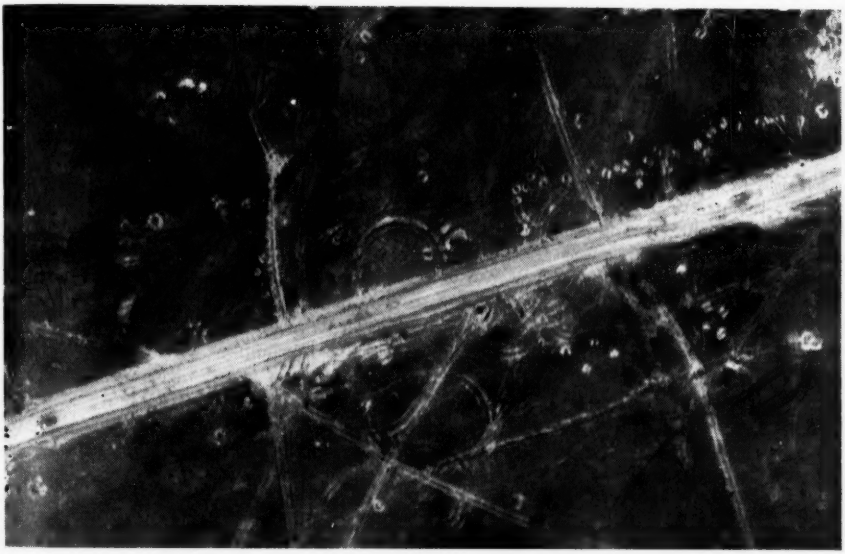
Composite photographs, in the form of mosaics, are of inestimable value in the study of enemy terrain. This is a normal function of G-2.

Overlays

These were overlays of the enemy defensive positions. The complete organization of the enemy position (including mortar positions, machine guns, foxholes, pillboxes, etc.) was shown, with an indication of the possibility of the various positions being occupied. The latter being arrived at by observing the degree of military activity as revealed by the tracks on the photographs.

The First Expeditionary Infantry Division was in front of an organized enemy position with which it had been in contact for some time, and photo-intelligence was always able to furnish G-2 with a clear picture of the strength and the nature of the opposition which could be expected from the enemy. Moreover, the disposition of the enemy artillery to our front, and the changes which took place within that disposition, could be followed by G-2, thanks to photo-intelligence.

When the ground was covered with snow, we could even tell which of the artillery pieces to our front were in action, since the marks made by the trails were visible to the naked eye on the white background of the vertical photograph taken during the months of December 1944, and January and February 1945.



Vehicle tracks reveal enemy activity. (U.S. AAF photo.)

Moreover, in order to orient reconnaissance and combat patrols, G-2 distributed annotated prints to the regimental S-2s indicating routes to be followed, and showing the enemy positions from which probable resistance could be expected in the carrying out of the mission.

Often we distributed to the regiments, as an annex to the overlay of the enemy defensive organization, annotated prints on which all enemy positions which had been discovered by photo-intelligence were marked in red.

The S-3 and S-2 sections of the infantry regiments valued these prints very highly for the assistance they rendered in the preparation of operations, and for the information which they gave of the terrain which had to be reconnoitered by troops which were given the mission of executing raids on enemy positions.

Routes of Communications

Maps do not furnish us with an indication of the true state of the roads which are being used by the enemy. The demolitions, which had been prepared or already executed along the roads over which we had to advance during the spring campaign were well known to photo-intelligence. We selected routes for the use of the reconnaissance troop when they were sent out on reconnaissance missions or were attempting to regain contact with the enemy. These selections were based on information obtained from photographs and enabled us to avoid bridges which had been blown up or prepared for demolition. This information we obtained from the overprints furnished by corps, which contained all the information which was available prior to the launching of an important offensive action.

Photo-intelligence was even able to furnish exact data relative to matériel which would be necessary for the repair of enemy demolitions on the routes of communications.

Artillery Objectives

Whenever our patrols encountered strong enemy resistance and indicated where it had taken place, this information was sent to photo-intelligence, which usually was able to determine exactly what resistance had been met. When the objective was such that it warranted the use of artillery, the coordinates were sent to the division artillery along with a description of the target. The opinion of photo-intelligence regarding the importance of certain objectives was always considered to be of great value.

A study of the photos containing objectives which had come under the fire of our division artillery gave us a good idea of the effect of our fire. The craters were visible, and the center of the zone of fire could be located on the photos when ground observation was not possible.

Conclusion

From this summary description of the elements furnished by photo-intelligence to G-2, it is easy to understand the importance of this agency which is at the disposal of the infantry division for the study of the enemy.

The factors, *enemy* and *terrain* can be thoroughly studied at division level, permitting G-2 to get a clear picture of the nature and intensity of the opposition which can be expected in the fulfilling of a given mission.

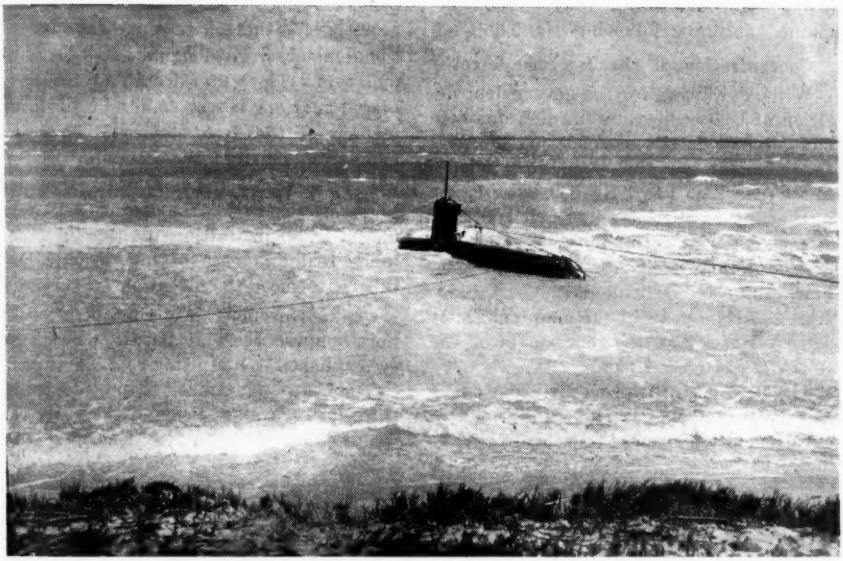
On the basis of information received from higher units, information gained through direct contact with the enemy, the statements made by prisoners of war, and photo-intelligence, G-2 is always able to furnish the General Staff with conclusions concerning the enemy possibilities relative to the mission of the division, in time for this information to be of value.

The Japanese Preparation for Pearl Harbor

Translated and digested at the Command and Staff College from a French article by Etienne Romat in "La Revue Maritime" (France) May 1946.

THE Japanese defeat has permitted light to be thrown on the matter of the preparation for the attack by the Japanese High Command on Pearl Harbor. Documents found on the battered cruiser, *Nachi*, which went down on 5 November 1944 in Manila Bay, and also the interrogation of prisoners, have shown with what care Tokyo had laid its plans several months in advance and how the results of the blitz attack exceeded the most optimistic of Japanese expectations. The Japanese success at Pearl Harbor came close to dealing America a mortal blow.

It was early in January 1941 that the idea of a surprise attack on the great American base in the Pacific took form. Admiral Isoroku Yamamoto, commander in chief of the Combined Forces, gave orders to Rear Admiral Takijiro Onishi, chief of staff of the Second Naval Air Fleet to begin a study of the operation. At the end of August 1941 Admiral Yamamoto called together all his subordinates for the purpose of obtaining their opinions relative to the plan for a future Pacific campaign, beginning with a surprise attack on Pearl Harbor. The outcome was Highly Secret Order No. 1 for the Combined Forces, which was distributed to the different squadron commanders on 5 November 1941 (eighteen days after the



Japanese midget submarine beached at Bellows Field, T.H. (Signal Corps photo.)

formation of the militaristic government of General Tojo 17 October 1941).

This order contained a paragraph entitled: "Preparations in case of the opening of hostilities," in which it was mentioned that, "When it shall be decided to terminate the preparations for operations, the recipients of Order No. 1 will receive directives relative to the approximate date (Y-day) for the beginning of operations prior to the opening of hostilities. The day of the opening of hostilities (X-day) will be fixed by an order from the Great Imperial Headquarters."

Two days after the distribution of this order, Admiral Yamamoto published his Order No. 2: "Initial preparations for war. Y-day will be 8 December." (The Japanese day, 8 December, Monday, corresponds to the American and Hawaiian Island date of Sunday, 7 December, dates in the Hawaiian Islands being twenty-four hours behind those in Japan.) The date of the final decision for the operation can thus be fixed at 6 November. But it was not until four weeks later, on 2 December that Tojo's cabinet irrevocably approved the opening of hostilities against the United States.

Following this ministerial conference, a secret order from Imperial Headquarters announced that hostilities against the United States of America "will begin on 8 December." In other words, approximate Y-day and the exact date of X-day were now but one and the same date. From a tactical point of view it would have appeared more logical to attack the American Fleet at dawn of a moonless night. But, as a matter of fact, the Japanese were perfectly conversant with the habits of the Pacific fleet which came into port and

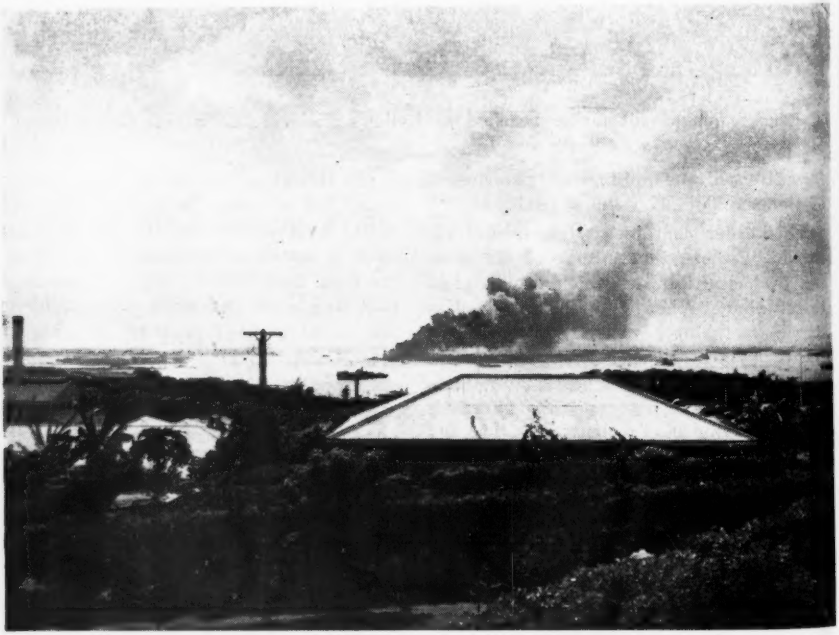
dropped anchor every Friday where it remained until the following Monday.

Concentration of the Japanese Fleet

Without waiting for the government decision of 2 December, Admiral Yamamoto had, as early as 14 November, given orders for the naval units that were to participate in the attack on Pearl Harbor, to assemble in the Bay of Hitokappu (Kuril Islands). The choice of this jumping-off point had been determined by the fact that geographically it constituted the best place from the standpoint of the maintenance of secrecy relative to the movements of the Imperial Japanese Fleet.

The fleet began its concentration on 14 November, and six days later the Japanese government telegraphed its representatives abroad to be in readiness to burn their secret documents on receipt of a conventional meteorological signal worded: "wind and rain." The general staff of the navy placed matters in the hands of the commander of the fleet, stating: "The commander in chief of the Combined Forces will issue instructions in order that the forces necessary for the operation may be placed in their waiting position in order to be ready in case of unavoidable hostilities, to meet the situation quickly."

On 22 November, the concentration of the Japanese Fleet at Hitokappu was an accomplished fact. In this cold island area the month of November is, paradoxically, the most favorable season of the year. The bay is inhabited by a few fishermen only.



Battleship *Arizona* on fire and sinking in Pearl Harbor after the raid by Japanese bombers. (Signal Corps photo.)

It was there that Admiral Yamamoto exposed the envisaged plan of attack to his commanders:

"The attacking force, maintaining the strictest secrecy with respect to its movements and an attentive watch for enemy submarines and aircraft, will enter the Hawaiian waters and at the very opening of the hostilities will deal a mortal blow to the American Fleet.

"After carrying out its air attack and taking cover against any counterattack, the squadron will leave the enemy waters to return to Japan.

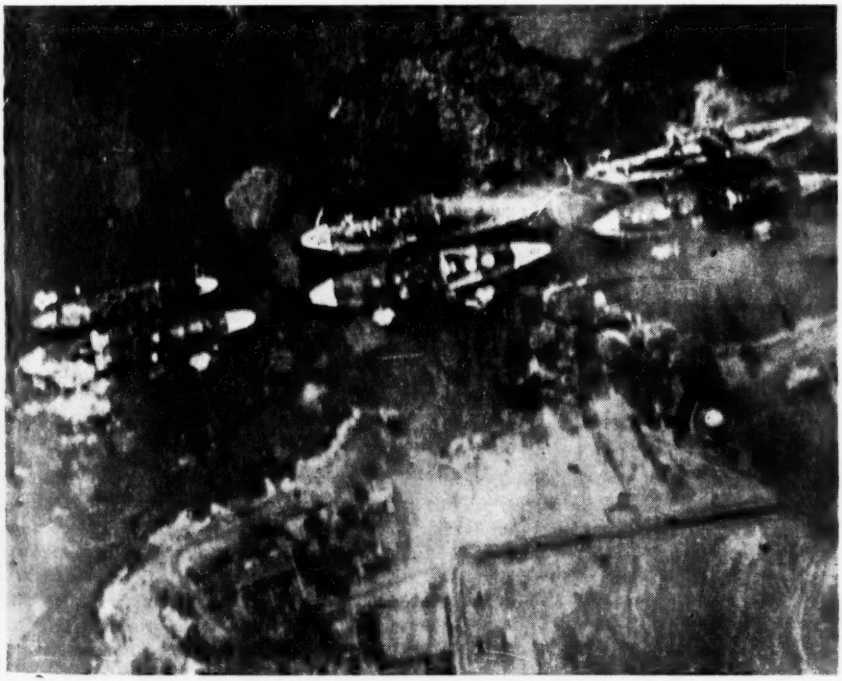
"In case the negotiations between the United States and Japan terminate in a favorable agreement before the appointed day, all the Combined Force is to return to its bases.

"The force destined for the operation will leave Hitokappu Bay on the morning of 26 November 1941 and is to be in Latitude 42° North and Longitude 170° East on the afternoon of 4 December for taking on more fuel."

No Landing

Thus, after the American Pacific Fleet had been knocked out of action and the planes based on the Hawaiian Islands had been destroyed, the Japanese Fleet was to withdraw without seeking combat.

The possibility of such an air and naval raid had been communicated to the officer pilots of the ship-borne aviation



Six damaged ships—Pearl Harbor.

as far back as 5 October 1941 in the course of a conference held on board the airplane carrier, *Akagi*. They had learned from Admiral Yamamoto himself that a surprise attack was planned on the American Fleet based in the Hawaiian Islands, and that its immobilization for a period of more than three months would give Japan the opportunity to occupy Borneo, the Philippines, Singapore and the Dutch East Indies.

The Japanese plan had not contemplated any landing in Hawaii. An amphibious operation had been rejected because of the impossibility of making the necessary preparations in so short a period of time. The slow speed of troop ships would make difficult the maintenance of secrecy regarding the movements of the attacking fleet. Then, the necessity for keeping this expeditionary force in supplies when once on land brought up problems in logistics and tonnage that were difficult to solve.

In September, the American Pacific Fleet had been reinforced and divided into three "task forces," two being at sea and one at Pearl Harbor.

Japanese Intelligence was kept minutely informed as to the various movement of these units, by its Hawaiian agents. The latter transmitted their messages by way of the non-censored telegraphic cable between the Hawaiian Islands and Japan. In addition, they made use of radio sets. If, for example, it was announced in the evening public broadcast that: "The German attaché is seeking a cook," Tokyo knew that a battleship had entered the port. Certain of these messages, if not the majority of them, had been deciphered by the Americans.

On the basis of this information, the Japanese waited until 22 November before they found six American carriers in the Hawaiian waters. They knew that the *Saratoga* was on the west coast of the United States. After setting sail on 26 November, the Jap fleet learned that the *Enterprise* would be "absent for two or three days from Hawaii, as it had left in the direction of the Philippines." In reality, the *Enterprise* had pushed as far as Wake Island to unload a group of fighter planes.

On 1 December the Japanese force received a message emphasizing the absence of all airplane carriers from Pearl Harbor and the presence, at anchor, of eight battleships and fifteen cruisers. As a matter of fact, there were eighty-six vessels of war concentrated at Pearl Harbor, eight being battleships, seven cruisers and twenty-eight of them destroyers—but no airplane carriers.

The principal element of the Japanese attack constituted a force of airplane carriers designated as a "shock force" protected by a "reconnaissance force."

In case these two forces should be discovered by American patrols, a supporting force of armored vessels was to set out from the Island Sea to assist the carrier force in a decisive engagement with the American Fleet. For this same contingency, the Japanese Navy had also made provision for the support of its other three fleets (the Southern, Northern and the South Sea Fleets).

In deciding on its plan of attack, the Japanese Imperial Staff had decided that the most effective weapon of destruction for the purpose was the aerial torpedo. They had taken into account the fact that the anchoring ground at Pearl Harbor was narrow and of slight depth (thirteen to fourteen meters). Consequently, the Japanese engineers had perfected a stabilizing arrangement for the missiles that were to be dropped by their aircraft, which would prevent their penetrating to any great depth. Moreover, making allowance for the fact that the anchoring ground and the American vessels might be protected by nets, the Japanese plan

included a bombing attack carried out both by horizontally flying planes and dive bombers.

The Employment of Submarines

The following are the principal functions assigned to the submarines. Until X-3, certain submarines were to extend their reconnaissance activities as far as the Aleutian and the Fiji Islands and Samoa, and report the presence of any American forces they might encounter.

Another group had the mission of taking up positions along the route planned for the squadron to follow, in order to make sure its movement would not be discovered.

The remaining units were, on X-5, to be stationed about the Hawaiian Islands, at extreme range, while one group engaged in advanced reconnaissance about the island.

On X-day, the submarines present in the sector were to observe and attack the American Fleet. Midget submarines were to carry out a surprise attack in the channel of Pearl Harbor. Lastly, in case the enemy should come out to fight, all were to pursue and attack him.

After the raid by the carrier-based aviation a squadron, or at least several submarines, were to be stationed between the Hawaiian Islands and the American coast for the purpose of intercepting merchant traffic.

Departure and Route

The carrier force left Hitokappu Bay at 0900 on 26 November with three tankers and one supply ship. Three submarines also left Hitokappu and accompanied the force. The remaining submarines, starting from the Inland Sea, deployed ahead of the reconnaissance force.

The General Staff had rejected the plans to follow the central route (in a direct line) and the southern route (by way of the Marshall Islands) because they passed too close to American occupied Wake and Midway Islands, thus jeopardizing the secrecy of the operation. On the other hand the northern route (the one that was chosen), out of range of American reconnaissance aviation and little employed by merchant vessels, presented certain disadvantages of weather, and difficulties in the way of the transfer of supplies at sea.

Slowed down to the low speed of its tankers, the attack force did not exceed a speed of thirteen knots. Chance favored the Japanese. The sea remained calm and all vessels, even the destroyers which had carried fuel oil in barrels, were able to refuel alongside the tankers. On 4 December, the rendezvous point (42° North, —170° East) was reached. All combat vessels filled up with fuel and headed southeast at a twenty knot speed.

When 800 miles north of Hawaii, on 6 December, Tokyo sent the following radio message: "Climb Mt. Niitaka." It was the signal for the attack. Increasing their speed to twenty-four, then to twenty-six knots during the night 7-8 December, the six airplane carriers raced southward, observing complete radio silence. In order to deceive the American interception services, the Japanese, through the medium of the radio traffic of their home radio forces and pretended radio activity, created the impression of a considerable concentration of naval forces in the waters of the Japanese Inland Sea.

The Attack

Having arrived at a point less than 200 miles north of Oahu, at dawn 7 December the airplane carriers released three waves of planes. Then the squadron withdrew at great speed toward the northwest. Between 1030 and 1330 it took on its planes again. Then, following direct routes, it arrived at Kure on 23 December (Japanese date).

As seen from Pearl Harbor, the air

attack occurred in three phases: First phase, torpedos and bombs from dive-bombing planes, second phase, horizontal bombing, third phase, dive bombing. The total duration of the air attack was one hour and fifty minutes.

Risks Accepted by the Japanese

For the Pearl Harbor operation the Imperial General Staff had accepted the loss of a third of its surface units, including two carriers, and the majority of its midget submarines. As a matter of fact, their losses totaled only twenty-seven planes and five midget submarines. In addition to this, the 1400-ton submarine, I-170 was sunk three days later by a plane from an American carrier.

The strategic aim of Yamamoto's plan had been attained and far exceeded: the American Battle Fleet was virtually out of action, leaving the Japanese Navy mistress of the Pacific for the few months necessary for the amphibious offensive.

The Future of Long Range Rockets

Digested at the Command and Staff College from an article by Sir Alwyn Crow from "The Journal of the Royal Artillery" (Great Britain) July 1946.

ONE of the most important fields of armament development to which impetus has been given by the war is the story of the rocket as a weapon of war, and it may well be expected that rockets will play an increasing part in the armament programs of all countries in the future, both for offensive and defensive purposes.

Rockets have been used extensively by all the major belligerents, and they may be broadly classified according to their general purposes. They have included:

(a) Large crash salvos in ground batteries against the enemy from both naval craft and from land batteries, and in the antiaircraft role.

(b) Aircraft rockets.

(c) A number of applications arising from the ready adaptation of rocket motors to the transportation of different types of payload. These have included antiaircraft wire barrages of the parachute wire-mine of the parachute-cable type; the projection of hose to clear minefields; rocket flares; and miscellaneous lifting devices.

(d) To assist take-off of aircraft, particularly from aircraft carriers and merchant ships.

(e) Long range and controlled projectiles.

The particular qualities of the rocket which have been mainly exploited are the lightness of the projecting apparatus, the weight and volume of fire and the economy of manpower.

The systematic study of rockets as weapons of war was first undertaken in Great Britain some two years before the outbreak of the war, when rocket development was coordinated under the direct guidance of the Sub-Committee of Air Defense Research, and the original main lines of objective that were laid down for extensive study were, in order of priority:

(a) Antiaircraft defense;
(b) Long range offensive use;
(c) As an air weapon;
(d) Assisted take-off of heavy aircraft.

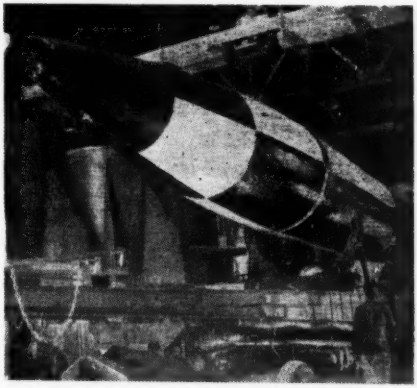
When viewing the experience with unguided rockets in the antiaircraft role, these original objectives should be borne in mind. It was all that could be done in the time available, and it may fairly be claimed that it did serve its purpose.

Perhaps the most important and valuable development of the rocket in the British service was the rocket carried in aircraft

and used either for the attack of tanks and strongpoints and assemblies of men on land; or, with a different type of head, for the attack of submarines. In the second use, success was early and immediate and it can be claimed that it played a not inconsiderable part at a critical time when the submarine warfare campaign was at its height.

Two applications of the rocket had far reaching effects. One was a mass concentration rocket barrage put up from converted tank landing craft and used as a cover for the landing of troops. This weapon was first used with success to ensure the landing on Sicily and subsequently at Anzio, and on many occasions including the operations on D-day. It was possible by the use of this weapon to put down a barrage of 1,000 rounds a minute with shells delivering some 7,000 pounds of high explosives on a concentrated area, and the total manpower necessary for operating this salvo was five or six men only. On the army side a somewhat similar type of multi-barrel rocket projector was available and used with success in Western Europe under conditions where a heavy concentration of fire was necessary for a short time.

The development of rockets in the United States started sometime after our own experiments and work for the army and navy proceeded practically independently; the former concentrating on fast burning high pressure units while the latter based their initial designs on early British technique. Most of the American weapons that finally emerged had a close family resemblance to the parent British weapon for various purposes; except that the Americans earlier made use of the principle of gyroscopic spinning to stabilize projectiles in flight rather than depending on the technique that was at first adopted by the British of stabilizing by fins. The same general type of application was aimed at—namely, to put up a heavy barrage from light equipment with relatively small demands on manpower.



The V-2 rocket is loaded on its transport.

As a general summary of the developments carried out in the United States and this country, it may be said that by far the greater amount of effort, for one reason or another, was expended on the evolution of relatively short range rockets having propelling charges of the solid or cordite type of fuel with total times of burning of one-half second to two seconds; and depending for their accuracy on fin stabilization or on rotation of the rocket by means of inclined nozzles or by spinning imposed on the rocket by firing it through rifled tubes. While, as the war proceeded, rockets of this type became more and more accurate as the technique developed, there is clearly a very long way to go before unguided rockets—and by this I mean rockets unguided by external means —can reach anything approaching the accuracy that can be obtained by ordinary guns. It is, I think, fair to say that with the exception of the aircraft use, rockets throughout the war were regarded as a means of obtaining amplified fire power by tapping new sources of production capacity. They were not explored primarily

The firing platform for the V-2.

on the lines of the advantages that could be obtained from the new technique of the self-propelled shell as against that launched from a gun barrel.

In Germany the trend was otherwise. For many years prior to the outbreak of the war, there was strong interest in the study and exploitation of rocket technique. A number of groups of scientists and technicians existed in the form of rocket societies, which, while handicapped by lack of financial support, were able to produce substantial improvements in rocket technique. As far back as 1930 the German military authorities turned their attention to the potentialities of the rocket as a weapon of war and decided that research and development should be actively pursued. With the advent of the Nazi regime, it was decided to intensify the drive for rocket development. A new establishment was set up at Peenemunde on the Baltic at a capital cost of 300,000,000 gold marks (approximately $60,000,000). Elaborate equipment and design facilities were installed and the establishment continued to grow progressively until it was estimated that during the latter part of the war it included some 2,500 scientists and technicians. Throughout the war, in addition to the research carried out in Peenemunde and other government establishments and universities, considerable work was being undertaken by industry, and as a result of this policy there arose considerable complexity in the types of rockets developed and the types of fuel used. This led to the production of a staggering variety of German rocket weapons, a complete list of which is not even yet available. I think it will suffice, for our purpose, to concentrate on the one of which we in this country had the most practical experience —the V-2.

The early work leading up to the V-2 began in 1933 when the A-1 rocket was designed. This rocket weighed about 330 pounds. It was about four and a half feet long and had a diameter of about one foot. It was followed in 1934 by the A-2, which in dimensions was similar to A-1 and differed only as regards the method of control. The A-2 rocket fitted with a motor developing a thrust of 660 pounds for sixteen seconds was successfully launched and reached a height of 6,500 feet. In 1938 a new model was investigated —A-3 which weighed 1,650 pounds, was twenty-five feet long and about two and a half feet in diameter. This rocket was fitted with a motor developing a thrust of 330 pounds for forty-five seconds. It contained an automatic control system which operated the rudders and the gas stream and when fired vertically it reached a height of approximately 40,000 feet, while it had a maximum ground range of about eleven miles.

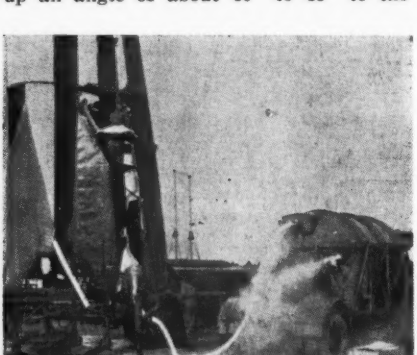
The next step was the A-4, which is known in this country as the V-2. The work on the A-4 was started during 1940 and it was a scaled up version of the A-3. Experimental firings started in July 1942 and the first successful launching took place about October 1942 when it

was reported that the fourth one to be launched flew a distance of 170 miles. The design went into quantity production towards the end of 1942, and the first attacks against this country started in September 1944.

The warhead was placed in the nose of the rocket and immediately behind the warhead were sited the main control instruments and the radio equipment. The outer shell of the rocket extending over this equipment was provided with large hinged panels affording access to and a means of servicing the instruments that were carried. The main fuels were accommodated in two large light alloy tanks occupying the central portion of the rocket. There were two fuels: one a seventy-five per cent solution of ethyl alcohol and water occupying the forward tank nearest the nose, and the other liquid oxygen occupying the rear tank. The remaining space of the rocket was taken up by the turbine driving the two main fuel pumps and with the auxiliary fuel supply. Finally, at the rear end was the main combustion chamber and exit nozzles; while around this unit were the stabilizing fins, and projecting into the exits of the nozzles were the main control vanes which operated actually on the gas jet.

V-2 rocket being elevated.

The rocket was launched vertically and rotated from the vertical until it took up an angle of about 40° to 45° to the horizontal. This occurred at about the time when the main fuel had reached complete combustion, i.e., after about sixty seconds' flight. The control was transmitted by the vanes which were placed in the exit jet gases. These internal controllers were each operated by separate electrical hydraulic servo units. The two internal and external controllers lying in the plane of rotation of the turbine rotor were connected through a special fitting so that each internal controller and its corresponding external controller operated in the same sense. Electrical coupling was provided between the two servos driving these controllers so that the controllers could be employed to provide roll and azimuth control. The other controllers, i.e., those lying in a plane at right angles to the plane of the turbine rotor, each had a separate drive which were, however, electrically synchronized, so that all the controllers could move up or down together and control all movement of the pitch plane.

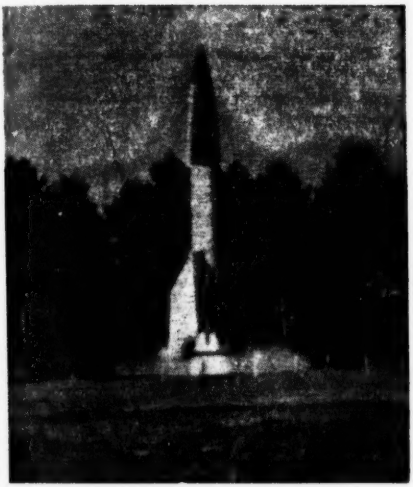


Liquid oxygen being pumped into the rocket.

The trajectory was interesting. In the early path the rocket reached a height of between twenty-two and twenty-three miles, a velocity of about 5,000 feet per second. This took place after about sixty seconds' flight, when the fuels were practically completely consumed. During this period the main control was provided by the internal controllers. Before the fuels were expended, the rocket path became parabolic, and the velocity fell as the height increased; the maximum height reached being about sixty miles. The actual operational range of a rocket varied widely. A few traveled as far as 220 miles, but most of the ones falling in this country averaged between 180 and 190 miles. It is difficult to make any estimate of the accuracy that was reached in the operational firings against the United Kingdom, but it seems improbable that it amounted to better than an average deviation of one per cent of the range.

It is clear that the advent of the V-2 has raised a problem of the first magnitude in the planning of our armament pattern for future wars. Germany has clearly demonstrated that it is a matter of practical possibility to launch long range rockets controlled with a fair degree of accuracy to a distance of anything from 180 to 200 miles. In other words, we are now faced with the possibility of developing weapons which can vastly outrange anything that can be done by normal artillery methods.

The V-1 and V-2 weapons produced by Germany represent a considerable technical achievement far beyond anything for which facilities and money have been made available in this country. These two weapons were developed with notable imagination, a factor which is all important; they were initiated and put into use in a relatively short time and with drive and with enthusiasm. At the same time, as one might expect having regard to

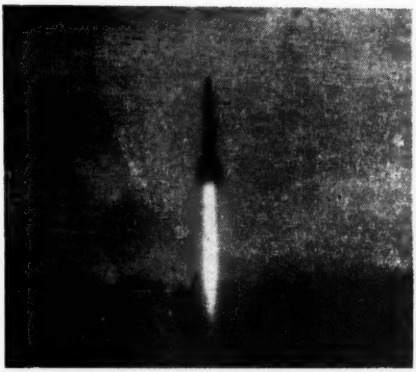


Just before leaving the ground.

the circumstances in which they were developed, both weapons are crude. The accuracy at maximum range is sufficient only for the attack of large areas. The number of launching accidents, particularly with the V-2 was high, and the preparations for launching were cumbersome. Further developments may be expected to improve considerably the accuracy and to simplify the use; and the applications are almost legion. It must be emphasized that the technique is in its infancy.

The technical problems which have to be surmounted in the evolution of controlled long range projectiles are formidable and extensive. They comprise the development of suitable propulsive systems, and we can say that as yet we have only touched the fringe of the possible range of applications; an immense amount of basic research into the utilization of new types of fuel and new combinations of energy, not excluding the utilization of atomic energy, is essential to the proper exploitation of this aspect of the problem. On the control side, we are fortunate in having as a background important and extensive developments that have been made in the general field of radar, but again there is here an immense amount of ground to be covered and the problem of solution and allocation of the various types of distance control that can be applied is formidable. I should not like to risk prophesying just how closely the control of a projectile can be applied. As we have seen, the only controlled projectiles of which we have direct practical experience produced by the Germans, are clearly in the very embryonic and elementary stages. Nevertheless, our radar experts feel sufficiently confident to embark on an objective of controlling a projectile flying at high speed for the interception and engagement of enemy aircraft at a distance of upwards of ten miles slant range, and my feeling is that we are certainly not behind the rest of the world in this aspect of the problem.

I do not know whether it is necessary for me to attempt to make out a case for the systematic investigation and development of long range guided projectiles.



The V-2 starts on its journey.

It must be clear to every one that given weapons of this kind the whole of our strategy and our tactics will be profoundly affected. I believe that I am right in saying that one of the major problems confronting the staffs during the war was the limitation of manpower. It is certainly true that every new weapon that was investigated during the war was judged primarily from this aspect. If we interpret manpower not only from the point of view of an all-out effort to meet special emergency conditions, but also from the point of view of the effort necessary to maintain a defensive reserve capable of meeting sudden demands, then any weapon which requires little or no maintenance, which requires a minimum of manpower for its actuation, and has in addition an almost limitless range of operation must of necessity be one to which we must give our most earnest consideration. This is particularly true in the field of guided missiles.

The Airborne Arm

Translated and digested at the Command and Staff College from a French article by Battalion Commander Ruchalet in "Revue de Défense Nationale," (France) April 1946.

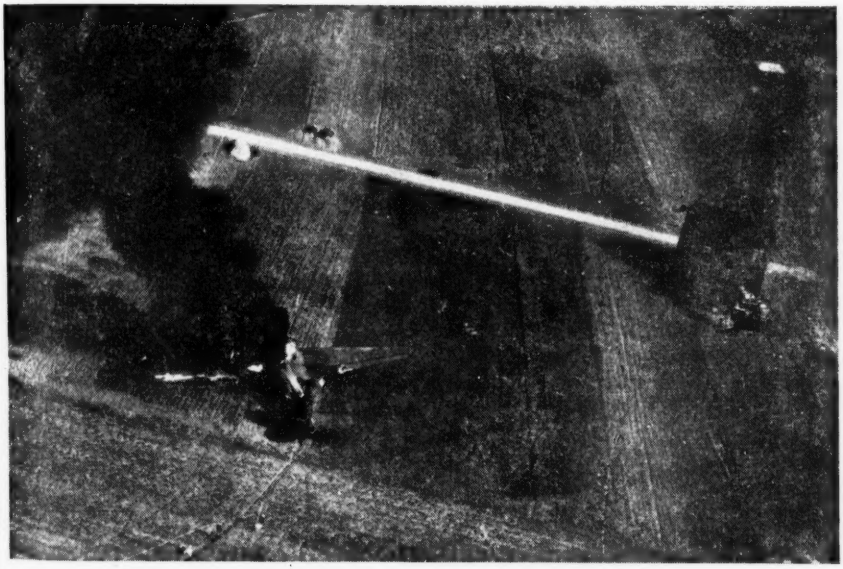
FOR purposes of study, airborne operations may be broken down into three phases: preparation for the operation, transportation and landing of the forces, and the battle on the ground.

Considering the fact that the transportation of forces and their landing are measured in hours and seconds while the battle on the ground may last for several days, many persons are tempted to conclude that airborne action is not, after all, anything more than simple aerial transportation followed by ordinary ground combat. Along this line of thought, we find the idea that the aviator is only the conductor of transportation equipment fairly analogous to that of the Motor Transport Service, and that the only difference between the airborne fighter and the ordinary infantryman or artilleryman is that the first makes use of a new means of transportation, and that for the creation of an airborne division it suffices to take a normal division, add a few parachutes to it, and after a little training and the substitution of lighter guns for the heavy ones, have the men take their places in planes or gliders. Now, when we delve into this question, we quickly perceive that two operations which are of a fairly different nature are often confused under the term, airborne: simple aerial transportation from one friendly airfield to another, and aerial transportation from a friendly airfield to a combat zone situated in enemy territory. In the first case we are faced with a simple problem in transportation in which the aviator is in no way different from a truck driver, and the airborne forces do not differ from infantry. In the second case, however, we find ourselves confronted with a particularly complex problem in aerial combat, for it requires that the units go into battle along with their transportation equipment.

The conducting into enemy territory of entire divisions by means of gliders, parachutes, and planes, requires a certain number of preliminary precautions. The neutralization of landing zones with the aid of frequent and unremitting bombing attacks is one of them. The terrain on which the airborne operation is to develop must be previously isolated by the cutting of ground communications over a considerable radius around the landing zones. The air must be swept

clean of the enemy, not only during the period of transportation itself, but even during the critical minutes and hours of the assembly on the ground. This calls for powerful fighter action and mass bombing raids, during the days preceding the attack, on all airdromes capable of intervening in the operation.

by air. Having been dropped down with little heavy matériel, they cannot expect other fire support than that provided by the air arm. These essential operations require excellent functioning of the signal communication system between air and ground. They necessitate abundant matériel, perfectly trained crews, and ground



A C-47 downed near Wesel, Germany by intense flak after releasing its glider. (U.S. AAF photo.)

The objectives aimed at by airborne forces are important points of the enemy's rear area. These are generally protected by antiaircraft defense, and it is rare that auxiliary means are not located nearby. Consequently, airborne forces are frequently attacked immediately upon their arrival on the ground. It is necessary to feed and support the battle on the ground. Isolated inside the enemy's dispositions, it is impossible at first to supply the airborne divisions in any way except

and air staffs and units that are used to working together.

The more one advances in the study of these operations, the more one is forced to the conclusion that airborne action is not simply ground combat following in the wake of an air battle, but that in reality it consists of a continuous air-ground battle.

In the same way that the airborne operation is inseparable from the action of air armies, it is also closely connected

with the action of those on the ground. In the presence of hostile armies equipped in the modern fashion the action undertaken by an airborne unit cannot be independent of the principal ground effort that is contemplated. Airborne forces may, by a surprise attack, seize possession of important positions and may, with good air support, hold the position for awhile. But in the face of an enemy who is able to attack they cannot last more than three or four days. This feature of limited capacity for endurance explains why the Anglo-Saxons consider that there is no sense in an airborne operation of any magnitude unless it applies to terrain zones of interest to the principal effort on the ground, and unless it occurs at such a distance from the main body of the ground forces that it is likely to be relieved in a matter of three or four days.

When we consider the vulnerability of low-flying planes and gliders, we are surprised at the relatively easy success of the landing phase of the airborne operations of the war. It is quite evident that the element of surprise is one of the essential and determining elements in the success and efficacy of this type of operation. After the Sicilian operation of 1943 the enemy Supreme Command caused its troops to assume antiairborne dispositions over the whole of the western front. In Normandy, as in Provence, all terrain regarded as favorable for the landing of airborne troops was saturated with mines and bristling with stakes. Many were the German directives calling the attention of the troops to these matters and prescribing the establishment of mobile reserves for warding off this danger. Nevertheless, we note that the local command was always surprised and that reaction was slow and generally disorderly. The forces on the ground appeared to be stricken with paralysis and did not counterattack till long hours (at times days) after the landing of the airborne forces. They nearly always missed, therefore, their chance for annihilating these units at the two critical moments of action: at the time they are cut loose, and during the period of assembly when the units, scattered in consequence of their leap, have not yet regrouped, and present a confusion of men, matériel, parachutes and gliders. The operations against Amsterdam and Fort Eben Emaël in 1940, the seizure of the island of Crete, the air invasion of Normandy, and even the Holland operation (September 1944), show plainly that the airborne elements enjoyed the advantage of complete tactical surprise.

One of the essential elements of surprise and effectiveness lies in the principle of mass action. A study of the airborne operations of World War II shows that the chances of success are increased in relation to the increase in quantity and strength of the means and forces committed. It should also be noted that this mass action is not fully effective except in those cases in which the airborne troops are dropped all at one time, equipped with their heavy weapons. It can be seen that in the exploitation of initial surprise, forces arriving with too great an echelonment in time and space, cannot be tolerated. It is of importance that the structure of airborne divisions be such that all their elements may be transported by air. It is running too great a risk to think of bringing up part of the personnel or matériel of the units by ground routes. The battle of Arnhem showed, in a striking manner, the accuracy of these principles. The partial failure, and the destruction of the British Airborne Division on the north bank of the Rhine, were due to insufficient density of troops in the immediate vicinity of the main objective of the attack—the Arnhem

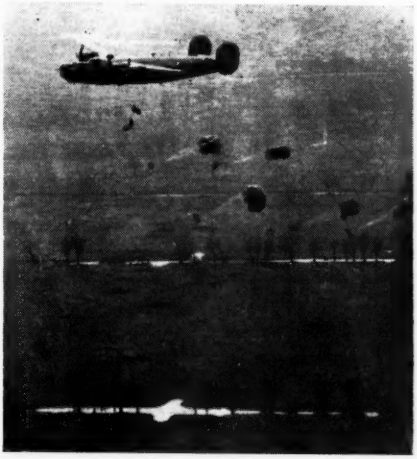
bridges. To this insufficiency of forces was added an initial shortage of heavy weapons, the result of transportation effected in two trips. It was acknowledged by the Germans themselves, that a slight augmentation of the initial density of the troops dropped at Arnhem would have opened the crossings of the Rhine to the Allies in September 1944. The magnitude of the aerial fleets required for these operations is one of the most difficult conditions that has to be met by the air-ground arm. There is no way of carrying out such an operation at a reduced cost. The full price must be paid in men and aircraft engaged.

We have seen that the essential elements of this action lie in the neutralizing power of aviation, in the fire and shock power of the airborne units on the ground, in the facility with which landings are made, in the possibilities relative to the support of the battle on the ground. These elements are strictly a function of the technical characteristics of the aerial equipment and of the weapons employed. Now, these technical characteristics are in a constant and rapid state of progress. The tonnage transported and the radius of action of the bombers have been constantly on the increase during the last five years.

As regards the battle on the ground, the appearance of new recoilless weapons which are both powerful and extremely light, provides paratroops and glider forces with weapons of a caliber that simply could not have been dreamed of a few years ago. Still more important for airborne units has been, perhaps, the bombardments at very great distances by projectiles of the V-2 type. This new weapon, combined with means of detection and radio control will be able, some day, to carry to units isolated in the interior of the enemy dispositions, massed and almost instantaneous fire support. It opens, likewise, new possibilities in the way of carrying supplies to these units that are at a great distance from their base, by means of guided projectiles.

Thus, without getting too far ahead of the march of science, we are able already to foresee that the air-ground arm is destined to undergo considerable development. The more powerful and faster the plane becomes, the more the technique of parachute landings are developed, the more the airborne division will be able to hold its own and resist the attacks of the enemy. Its present weapons, as regards heavy armament, requires the limitation of its employment to operations at a short distance from the main body of ground forces and in strategic situations where the enemy has few reserves at his disposal for counterattacking.

Technical progress will permit expanding the maneuver of airborne units in time and space and of thus reaping full advantage from the essential characteristics of these forces.



From low level, B-24 Liberator drops supplies to airborne forces east of the Rhine. (U.S. AAF photo.)

Between 1919 and 1939 the tank had seen its speed, its radius of action, and its power augmented ten-fold as the result of improvements in the motor, but it continued to operate at but short distances from the main bodies of forces, bridled in its action by difficulties in the matter of support by an artillery which at that time was incapable of following it. Thus, considerable potential energy, unsuspected capacity for maneuver and penetration were available and awaiting only the advent of a rapid and accurate system of support. The combination of the dive-bomber and of radiotelephony constituted that technical progress which freed the tank from the chains of artillery support and permitted it to make full use of its new power. Thus was developed the magnificent maneuver of the *panzer* which, in a month's time, crushed our army. Tomorrow, analogous technical progress will free the airborne divisions from the bonds which bind them closely to the action of the ground forces, and once again will suprise those armies which, will not have been able to adapt themselves to the incessant advances of science and industry.

Essentials of Tank Attack

Translated and digested at the Command and Staff College from a Russian article by Lieutenant Colonel L. Stetsiuk in "Krasnaia Zvezda" (U.S.S.R.) 31 May 1946.

SWIFT maneuver, combined with concentrated and accurate fire, is the basis of modern tank attack. The character of the attack depends upon the purpose of the employment of tanks. In breaching a deeply echeloned position tanks operate in close contact with the infantry. It is obvious that strict planning of the operations of all arms participating in the attack as to mission, place, and time, so necessary for the success of the breakthrough, limits the tempo of this type of attack and the maneuverability of the tanks somewhat, and affects the methods of conducting fires. This is especially true in the case of mass employment of tanks. Here, the tanks do not break away from the infantry, but utilize the effectiveness of the artillery barrage, which is planned to conform to the infantry's rate of advance, as much as possible.

Following the breaching of the first hostile position, the tanks acquire more room for maneuver, but tank action is still subordinated to the interests of the infantry.

The character of the attack changes completely in the independent operations of large tank units, especially in hostile rear areas and in pursuit. Here the tanks can freely utilize their principal characteristics: maneuver, speed, and fire.

Tanks in Support of Infantry Attack

Success in this type of attack depends largely upon the accurate study of the hostile fire system and defensive obstacles. Reconnaissance data received from other units or arms cannot be depended upon. It is the duty of all tank commanders and tank crews to reconnoiter weapon emplacements and obstacles, especially antitank obstacles, both in front of the hostile main line of resistance and in the depth of the position. It is also important to know the location of paths assigned to the tanks for passing the obstacle.

Thorough knowledge of the terrain up to the main line of resistance and beyond enables the attacker to foresee and to work out all tank maneuvers for the

attacks. Knowing the terrain, one can determine beforehand where, and beyond what cover a given tank or a tank unit will stop to fire. It will also be possible to decide on a definite order and method of overcoming obstacles, to work out special measures for the security of the flanks and rear of the attacking forces, and to take care of all the problems of cooperation with other units participating in the attack.

The most advantageous formation, or disposition, in the area of departure is the one in which the tanks assume the formation in which they will attack. But this depends upon the situation and especially the terrain. The direction of the impending movement is carefully studied, especially by tank drivers. If the number of paths through obstacles or through the battle formation of the supported infantry is limited, the tanks are formed in columns. Having passed through, the tanks deploy in the formation decided upon for the attack.

The importance of coordination in the movement of tanks and infantry cannot be over-emphasized. The time when the tanks begin moving forward depends upon the distance between their line of departure and the hostile main line of resistance, and upon the time set for the infantry assault. Sometimes, the infantry springs up before the tanks have pulled up, and this again is done for the same purpose—to deliver a simultaneous blow upon the main line of resistance. When the first trench has been captured, the tanks, protected by artillery fire, move straight forward and destroy hostile weapon emplacements.

As mentioned before, upon the termination of the artillery fire supporting the assault of the first position, the tanks acquire more room for maneuver, but continue to maintain contact with the infantry.

Independent Tank Attack

Tank action in hostile rear areas or in pursuit is made up of a series of short but swift attacks, most of which start from the march formation. This formation sharply limits the employment of available fire power. A tank company in march formation can use only about ten per cent of its fire power. This emphasizes the necessity for quick deployment of tank units upon the sudden appearance of the enemy, especially his armored forces. It may be said that success in tank attacks is possible only when the time required for bringing into action all available fire weapons is as short as possible. For this reason, if part of the tanks, while changing to combat formation, cannot conduct fire, those units which have already deployed should support, by their fires, the units still in the process of deployment.

When tanks move in march column and the enemy appears on one of its flanks, which calls for an immediate attack, all the tanks in the column deploy in a line. Subsequent straightening of the formation is covered by the fire of part of the tanks.

When a threat to one of the flanks develops during an attack, the "line" of the combat formation swings in the direction of the objective. The wing of the formation nearest to the axis of the turn slows down and steps up the intensity of its fire, while the opposite wing increases its speed in order to even up the line now facing the enemy.

Flank security is extremely important. Open flanks of companies and battalions are protected by at least one tank platoon. The latter does not change its direction, but opens fire upon the enemy threatening the flank. These tanks are echeloned to the right or left rear, which enables them to fire not only in the direction of the flank, but also straight ahead.

After an attack, combat formation is usually broken. If, under these circumstances, the unit is to engage in another attack, separate tanks or platoons which happened at the time to be ahead of the main body of the unit seek cover in the terrain and open fire upon the enemy while the unit reforms its combat formation. As soon as proper formation is assumed, the covering force takes its place in the formation and participates in the attack.

Because of the technical and constructional peculiarities of the tank, modern tank attack is a very complicated operation and calls for perfect knowledge and execution by tank crews of their duties. Watching the commander and his signals, keeping proper intervals and sticking to the assigned place within the combat formation—all this and numerous other details must be meticulously observed by all the personnel of the unit. Iron discipline, high combat spirit, and skill, so necessary for the effective operation of individual tanks and of small and large units, make for the effectiveness of modern tank attack.

The Evolution of the French Infantry During the Course of World War II

Translated and digested at the Command and Staff College from a French article by Lieutenant Colonel Bonnaud in "Revue de Défense Nationale" (France) July 1946.

The Campaign of 1939-1940

FROM 7 September to 20 October 1939, French troops operated ahead of the Maginot line between the Moselle and the Vosges. The Supreme French Command, by adopting an aggressive attitude, hoped to "draw off" a part of the German forces that were overrunning Poland. During the course of the September fighting, our units penetrated into enemy territory and attempted, without success, to reach the advanced posts of the Siegfried Line. In October they were forced to fall back in order to be in a position to ward off a general attack by the enemy whose eastern forces had just become available in consequence of the defeat of the Polish army.

The fighting during this period took on the character of local engagements carried on by regimental and battalion echelons with the support of divisional artillery.

The French infantry found itself face to face with German infantry which displayed an aptitude in maneuver and a vigor in action that could not help but impress our inexperienced troops. The enemy protected himself with mines and a multitude of booby traps which caused serious losses among our troops.

When the order was given to withdraw, our units did not have the impression that they were being forced to do this by the enemy; some of them only consented with regret to abandon the captured terrain. They delayed their departure from their positions, but the enemy soon was everywhere. Filtering through the gaps along an uncertain front, he rapidly intervened on the flanks and often even in the rear of the garrisons.

In the advanced position which marked the limit of our withdrawal in October 1939, our troops were stretched out over fronts that were too vast for them to cover and the strongpoints, which were not contiguous, had to be defended in all directions.

During the course of World War I, the

infantryman became an excavator. As soon as maneuvering in the open was rendered impossible for him, he clung to his positions by digging in. Everything might lead us to believe that the respite that was granted to us on the western front would have led the infantry to the creation and development of a network of subterranean organizations which would have increased the possibilities of resistance when the enemy assumed the offensive. But this did not happen. In the outposts of Lorraine, the most exposed of our elements fitted out mediocre shelters. The frequent reliefs were not calculated to incite the successive occupants to improve their combat positions.

On the remainder of the front, where they were not in contact with the enemy, the troops spent their time filling in the gaps in our system of fortifications. The work was carried on in a half-hearted way, only. The continual rains and the freezing weather were sufficient reasons for discontinuing the work.

The infantryman was abandoning the pick and shovel and ceasing to organize the terrain. The existing stagnation was not alone strategic or tactical but was also mental and moral when the blow of 10 May 1940 fell.

In an unequal struggle against the mass of enemy armor and motorized forces, and under the blows of aviation which ruled the skies, the French infantry, harassed, decimated, isolated from its artillery, and deprived of the aid of its own tanks, attempted to hold back the rapidly increasing flood which submerged the French territory.

From 1941 to 1943

The French infantry was, however, again to know glorious days in the operations carried on by the Free French Forces from 1941 to 1943 at the side of our British allies in Eritrea and in Libya, and alone in our equatorial African possessions.

It was obliged to adapt itself to a vast desert terrain in which it had to face an enemy who was powerful numerically, who was motorized, often equipped with armor, and supported by aviation.

The armament of these French forces was, initially, that which the units had managed to retain or which they had discovered in the equipment of the territories which rallied around Free France. Thus, we continued to use the automatic rifles of 1924-1929, the Hotchkiss machine gun, the 81-mm mortar, the 25- and sometimes the 47-mm gun.

The importance of antitank armament in these campaigns rapidly led the infantry to develop and improve its weapons by whatever means chance placed at its disposal. The 25-mm guns being notoriously ineffective against the tanks of the enemy, and the 47-mm existing in insufficient number, it was necessary to fall back on the 75-mm gun. The guns were mounted on vehicles: trucks or caterpillar vehicles ("bren carriers"). These improvised self-propelled mounts were not to limit themselves exclusively to antitank roles. They were to be equally employed, depending on circumstances, as assault guns and even as "straight artillery."

The only means of signal communication capable of giving satisfaction, was the radio. The telephone was no longer employed except on rare occasions, and in defensive situations. The equipment of the units permitted their establishing contact forward up to and including the company.

In the expanses where it was called upon to operate, the infantry had to be motorized. The transportation of food supplies, water, ammunition, motor fuel, and all the equipment used in combat required many vehicles.

As for morale, the infantry of the Free French Forces displayed remarkable spirit and aggressiveness, exalted as it was by the success which led it toward the French soil of Tunisia where it joined forces with our North African army and the Allied forces to complete the crushing of the enemy.

The Tunisian Campaign (1942-1943)

The infantry of 1942 was more poorly equipped than that of 1940. Its individual weapons were those of the previous war and were in a state of advanced wear. Its automatic rifles and its mortars were good. There were no submachine guns. Thirty-seven millimeter guns had been secretly constructed during the armistice period in the arsenals of the Navy with whatever means were available. These did not give the results that had been anticipated, in the face of the enemy armor. A few 25-mm guns they had succeeded in concealing were placed in service again. Antiaircraft weapons were nonexistent.

The transportation of the units had been constituted of requisitioned vehicles whose mechanical condition was but mediocre. Abandoned vehicles lined the road from Algeria to Tunisia long before the combat zone had been reached.

Generally speaking, the equipment of the men was insufficient because it had been necessary to assemble it without the knowledge of the enemy's control commissions. There was nothing more to be expected from the home country, which ordinarily looked out for the needs of its overseas forces.

Little by little English and American weapons were distributed to the units: submachine guns, 57-mm AT guns, jeeps and trucks. The French army was modernized during the course of the battle itself. From April on, it took a large part in the offensive operations which were to force the enemy to capitulate.

The Reconstitution of the French Infantry (1943)

The American equipment destined for the French army was distributed to it during the course of the summer of 1943. The armament allotted to the infantry was, in part, much like that which it already possessed. Its characteristics did not differ much. Some equipment, on the other hand, was entirely new.

The individual weapon of the infantryman was the Springfield rifle dating from the beginning of the century. It possessed the advantage, as compared with the French rifle and carbine, of using the same ammunition as the automatic rifle and small caliber machine guns. Some of our troops were supplied with the self-loading carbine which was light, accurate, possessed of a rapid rate of fire and, in consequence of these qualities, especially appreciated.

The infantry squad still possessed an automatic rifle.

The machine guns (the light, air-cooled and the heavy water-cooled), came into use, the first in the rifle units, the second in the battalion heavy weapons company. They possessed, from the double point of view of their rate of fire and their positiveness of action, undeniable superiority over the Hotchkiss machine gun.

The 60- and 81-mm mortars did not differ from the French mortars of the same caliber except from the point of view of greater range.

The antitank weapons comprised portable guns and weapons. The antitank guns were of 57-mm caliber and were towed. As imposing as this augmentation of power may appear in comparison with the 25- and 37-mm guns, it was still insufficient. The progress that was being realized in armor was more rapid and marked still.

The portable weapons employed rocket

projectiles of the hollow charge type, capable of perforating the best of existing armors. They represented the most definite progress of this war in the way of infantry armament. The infantryman was now in a position to face enemy armor in close combat.

The infantry had been for a long time demanding its own direct accompanying artillery. The providing of the regiment with six towed, 105-mm howitzers appeared to satisfy its demands.

The adoption of motor transportation brought about great changes. The normal infantry abandoned all its animals, and in their place received motor-driven army vehicles which were rugged, powerful, and quite able to travel over varied terrain. The 200 vehicles of the regiment took care of the transportation of the equipment of all the units and of part of the personnel.

In adopting Allied equipment, our infantry was logically led to pattern its organization after that of the American infantry with the exception of a few details due to the nature of our troops, and, to a certain extent, our own conceptions.

We have described in the foregoing, the qualitative evolution of the infantry's armament. We must emphasize here the changes that have occurred in the matter of its distribution to the various units and the increase in the number of curved-trajectory weapons. The rifle company possessed three 60-mm mortars in place of a single one. It had only three platoons of rifle troops instead of four. This reduction was, however, compensated for by the presence of one squad of two light machine guns. The battalion possessed six 81-mm mortars. It lost half of its machine guns: eight in place of sixteen. We no longer find, in 1943 any flat-trajectory weapons outside the battalion.

The infantry continued to be predominant in battle. It was still necessary for holding terrain won from the enemy, but the role of the other arms had grown.

In the face of the weapons that the enemy brings into action either for neutralizing or for destroying it, the infantry cannot act unless there are employed, in its support, weapons at least the equal in numbers and power of those of the enemy.

It was with the artillery that the infantry was most intimately joined. The artillery was incorporated into the rank of the infantry in the form of a few howitzers which were with the infantry from the beginning to the end of the battle. During the course of a campaign each infantry regiment had, as an associate, a battalion of artillery, the two constituting the essential part of the tactical group (the "regimental combat team" of the Americans). The artillery liaison officer lived with the infantry, and the direct support artillery was called into action by the infantry.

The evolution of the tactics of the French infantry from 1939 to 1945, however, was not so much in the principles themselves governing the action, but rather in the spirit which gave life to these principles. While at the beginning of this war our infantry was clearly dominated by the German infantry, we see it recover its equilibrium and seek, in its turn, to impose its will on the enemy.

In the final analysis it is morale that is the supreme factor in infantry. In this respect, the infantry we had in the Italian, the French and the German campaigns, was of a quality rarely equalled in the past.

Glimpses of the Future

The evolution of the infantry continues and a serious effort at modernization which could not be carried out during the war must be made in the direction

of a general reorganization of the French army.

The infantry's armament against the armament of the enemy must include, first of all, a modern individual weapon which is light, accurate, and automatic in its operation. The American carbine answered these requirements. We believe that the same will be true of the French Model 1945 automatic rifle.

The submachine gun, weapon *par excellence* in close combat will be distributed in sufficient quantities to the units and will be employed as the armament of shock groups.

Curved trajectory weapons will be retained and the number of them even increased; 60- and 81-mm mortars to which will be added the heavy 120-mm mortar which had already been constructed.

Towed infantry guns will be replaced by self-propelled 75-mm or, preferably, 105-mm infantry howitzers.

The infantry's antitank weapons will be the portable weapon launching a hollow charge, rocket-propelled projectile and will be furnished to each elementary group, and a self-propelled cannon which will be, depending on technical developments, of a model derived from the present tank destroyer or an application of the principle of the rocket projectile to a heavy weapon.

The infantry's antiaircraft armament will be transformed, for we consider the weapons possessed by the units at the present time to be entirely inadequate.

Now and henceforth we must see a certain number of our infantry divisions entirely motorized. They will constitute, with the armored divisions and the airborne units, a maneuverable force capable of intervening with the desired rapidity at any point of the national territory or any other theater of operations for, though we cannot know in what manner a future conflict will start, we may be certain that its unleashing will be of a hitherto unknown brutality.

We are not able to foretell the general evolution of weapons of destruction. We believe, however, that the infantry should continue to arm itself against the tank and against aviation, whose possibilities are increasing in an amazing way with each day. It should develop its flexibility and its mobility.

Thus, if it is able to adapt its means and its organization to the perpetual development that weapons of war are undergoing, the infantry will still continue to be, for a long time, "the Queen of Battle."

Peace in Our Time

When Naziism is extinguished, temporarily or apparently permanently, can we assume that no other nation will try to have its way by force? The justification for such an assumption is gravely in doubt, especially if the opportunity for the use of force is offered by the absence of armed strength to prevent it.

Brigadier E. C. Anstey, from his book "Peace in Our Time" (Great Britain)